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From an Original Drawing by G. M. Oppenordt (1672-1742)
R.I.B.A. Collection

Address to Students

BY THE PRESIDENT, MR. E. GUY DAWBER.

[Delivered at the General Meeting of the Royal Institute of British Architects, on Monday, 1 *February* 1926.]

I DO not wish to weary you with the trite remark that we are all students. Having arrived at your present stage of learning you will have discovered that the sense of power derived from the acquisition of knowledge and the increased appreciation and enjoyment it gives of the fine things in life render its pursuit one of the main objects of our existence.

We, your elders, are far more interested in you than you are in us. We are not in the least important to you, and we know that age is not necessarily another word for wisdom.

You have all of you your own ideas and have no doubt, and quite rightly, settled long ago the plan of life and work you will follow, so that I do not propose to offer you any advice on that subject. But perhaps you can profit, if you wish to do so, by the experience of older men, and especially by their mistakes and failures, and so I propose to tell you a little of the difficulties and the problems which occur in every day practice and the facts which have to be faced in the calling which you have chosen. The first, and a very important point in our profession, and indeed in any profession, is the acquisition of a good, sound education, for without it an architect, however gifted as a designer, can neither cope with the difficulties which continually arise in his daily work nor meet his clients on equal ground. At the same time, although I am a firm believer in the advantages of an academic training, I am equally certain that an academic education only will not be of any use unless you have practical knowledge and understanding as well. If you study the lives of the men who have been successful you will observe that they have achieved success primarily through love of their work, but you will also realise that affection for the chosen pursuit is not by any means sufficient, and that the most important thing is the absolute determination to pass nothing as understood which is not understood. It is all very well to be persevering and ambitious, but these qualities will not serve unless you have practical knowledge and a grasp of your subject. All your academic prizes and learning may be mere lumber unless they bring you increased understanding.

At the outset of my career I always found that one of the most difficult things was to realise the ideas of my clients, not because I was incapable of doing so but because my enthusiasm for my own conceptions blocked the view. I have learned in years of practice the absolute necessity of concen-

trating all one's efforts on the complete understanding of one's clients' views and wishes, though I am not suggesting the advisability of carrying out all their ideas. Far from it.

Another difficulty which confronts one is the necessity of disregarding the importunities of small details and subordinating them to the main conception. The difficulty of knowing what to do is often nothing compared to the difficulty of knowing what not to do. I am reminded of the admirable advice given me years ago by a very great and shrewd man of the world who had both knowledge and a great love of art. He told me when I started practice for myself never to neglect the smallest trifle that went wrong in any commission that I had to execute, and, however irksome and infinitesimal it seemed, to give it my own personal attention at all costs. He also urged me never to delay the immediate settlement of the smallest detail, or the answering of letters ; for arrears of correspondence and small things to be attended to, if allowed to accumulate, worry and depress like unpaid debts. All these precepts I have always tried to follow.

Life, after all, consists mainly in the settlement of small details of daily routine. It is not often we are called upon to make an important decision or to solve an insuperable difficulty; but when we have to face a serious problem we find that the settling of some minor matter about which we can see our way clearly will often help to overcome the serious trouble. It is the doing of what we can do which helps us in the doing of what may seem impossible.

Another of the difficulties of the calling you have adopted, which comprises so wide and various a scope and requires such an exacting apprenticeship, is the necessity for fitting in one's artistic ideas with the stern realities of every day business.

Neither genius nor ability will avail if the practical side is neglected. What credit will you gain for your charmingly designed rooms, your beautiful elevations, or your well-chosen materials, if the rain gets through the walls, or the chimneys smoke, or your work costs more than it should ? These may alienate at the end of your commission the friendship and esteem of a client which you may have greatly prized. Believe me, these are not matters to be lightly passed over. You young men are very fortunate to be living in this age with all the facilities and opportunities which are provided for study. When I look back on the days of my pupilage in a country town with none of the advantages you have to-day, I am amazed at the progress being made every year in the systematic education of architects in the various schools and universities throughout the country. The haphazard method of teaching, or not teaching at all, in my early days, depended in a great measure on the master in whose office we served our apprenticeship, and it says a great deal for the system of those days that all our most excellent and brilliant architects went through this method of training.

On the other hand, it is open to question whether the teaching in our architectural schools to-day tends not only to the elimination of individuality but to the production of a stereotyped sameness of idea—of mass production in fact. This perhaps is unavoidable when the students in each school go through the same training and are taught to solve their problems in more or less the same way ; but here again everything will depend upon the student himself, whether he wishes to become a mere cog in the architectural machine, or to make his own way and strike out a line for himself.

I have always felt that students, at any rate for some part of their training, should be taught architecture by architects themselves, by those who come into daily contact with the difficulties and facts of every-day practice and keep abreast of the problems of the moment. In days gone by all our great painters and sculptors learnt their arts in the studios and workshops of the actual craftsmen themselves—they saw work being carried out before their eyes by men who gained their living by it, a system followed I believe in France to-day.

Our schools encourage this training and urge that all students, after passing through their school or university course, should spend time in an architect's office as improvers or assistants before attempting to commence practice on their own account.

Many years ago, through force of circumstances owing to serious overstrain of my eyes, I spent some years as Clerk of Works on two large buildings, one in London and one in the country. For some three or four years I daily superintended the quarrying and working of stone, the shaping and fitting of timber, and the placing of each in their respective positions in the building ; the arrangements of systems of heating, electricity, and sanitation, all of great interest in themselves, and each contributing towards the completion

of the whole structure. Many consider this sort of training superfluous and that work of this nature should be delegated to others, but without practical knowledge of the capabilities and limitations of materials it is impossible to utilize them properly in the buildings you design so as to obtain the best results and the relative values from each. The experience I gained of the use of material and of simple problems of construction has been of inestimable value to me all my life, and I would strongly urge you to try and follow the same course.

In the attempt to make your work stand out and surpass that of your contemporaries, while many of you will no doubt be attracted to the latest movements, it is just as well to pause before you allow yourselves to be carried away by novelty, for the essential thing in originality is the idea, and if it is a new idea it is worth noting. But do not easily be led off the beaten track to follow it. Just as you know that the best building materials are our own native stone, brick and tile, so you will find that the best buildings from every point of view are those which are worked out in a simple, straightforward, common-sense manner. The study of good buildings in any country shows that the finest proportions, the happiest effects, both in plan and elevation, are obtained in the simplest and most direct way.

The question of taste in this country to-day is a very serious one, a question which is greatly exercising the minds of all lovers of town and country. When you come to think of it, it is highly improbable that in Renaissance times the "man in the street" in Rome or Florence really possessed any more definitely trained taste in architecture than our people to-day. But without doubt they had some instinctive sense of proportion, dignity and suitability that enabled them to appreciate the work of their builders. If we could only reach that stage in this country we should have infinitely better architecture.

This is a question which affects you as much as it does everyone who is alive to the serious and growing danger in our midst, for in your hands lies much of the future remedy. Although a great deal can be gained by publicity, this in itself is quite insufficient to meet the case, for the average citizen will pay little attention to propaganda about a subject in which he is not interested. The indifference of the public to the importance of civic beauty is a lamentable and tragic fact. We might look upon the recent acrimonious criticisms in connection with the Rima figure as a most salutary sign had they not been so misdirected. After all, the figure of Rima, whether you approve of it or not, occupies only one small and very secluded spot in Hyde Park. It is seen by only a small percentage of people who mostly go out of their way on purpose to inspect it. But, unfortunately, the buildings which we see throughout the country, in its towns and villages, and in the heart of beautiful rural spots, are much more in evidence. Had the public who were so upset by the Hudson Memorial raised their voices against the ruin of our countryside, how deeply and with what gratitude should we have welcomed their interest.

There cannot be good architecture in any country unless there is a public demand for and an appreciation of fine work. When we look back to the days of ancient Rome, we see that all its great monarchs and legislators understood and appreciated the value of great architectural monuments as an appeal to the civic pride and patriotism of the people.

Julius Cæsar built the Basilica Julia in the Forum, Agrippa the Coliseum, and Caracalla gave the people the marvellous baths which still bear his name and which, in spite of his vices and cruelties, gained him great popularity. Maxentius again, who understood the majesty of the law, added to its importance and dignity by erecting the basilica which is now known as the Basilica of Constantine; and in later times we see the indirect influence of architecture on the religious mind and how the Church has always fostered its appeal to the senses by erecting the most beautiful buildings in which to minister to the religious wants of the community.

Think what an opportunity has been lost in this country since the close of the war, when instead of erecting the countless memorials, which, after all, are but the expression of the sentiment of the moment, the nation had demanded some great memorial which would have stood for all time as a symbol of the country's greatness and sacrifice.

To-day the public of all classes is largely indifferent to its surroundings. It knows but little of the claims of architecture or its influence upon our lives. Although architecture, in certain instances, as practised to-day was never at a higher level, unfortunately this is only a small proportion of the whole, the bulk of the buildings we see around

us being of inferior merit and generally not the work of architects at all.

Our profession, unfortunately, lends itself easily to the charlatan and the ill-informed, many of whom possess no architectural qualifications, and the inability of the public to discriminate between the good and the bad perpetuates the evil. The only remedy lies in education. We are doing our utmost to train you students to become good architects, to give you the best possible tuition to fit you for the positions you will ultimately be called upon to fill, and if we do this it is only right that the public generally should be educated to understand what architects are doing and striving for.

The teachers in our elementary and secondary schools, and for that matter in our public schools, as a rule know nothing about architecture, nor of its importance to the community at large; and even the teachers at our colleges and universities are in the main ill-equipped in that direction. I do not suggest that they or their pupils should be taught architecture in the technical sense, but I do feel that we should try to get into the curricula of our schools some definite recognition of the importance of architecture and town planning to the ordinary citizen. The student should be taught the value of dignified buildings, of well-arranged streets and open spaces, of cleanliness, order, and spaciousness in our public thoroughfares, and the maintenance of the civic spirit in the city, town or village he dwells in. Had this been done 30 or 40 years ago the lamentable sights we see on all sides, the ill-considered buildings placed without regard to their environment, would never have come into being.

In any social assembly to-day you will find the subjects of architecture, painting and sculpture are seldom mentioned, seldom even considered as worthy of discussion, unless to express the feelings of those who borrow their ideas from the current press upon the ugliness of Rima, the unsuitability of the Artillery Memorial, or the replacement of the Piccadilly fountain. Any intelligent criticism of the architectural buildings in our towns, cities, or villages is never heard. The subject is considered as too uninteresting for discussion, and the average man is as ignorant of its real importance in relation to civilised life as the inhabitants of Timbuctoo.

In the eighteenth century, and even later, no well-educated gentleman was considered to have completed his studies unless he had made the grand tour of the principal towns and cities of Europe. If you read any of the old diaries and memoirs you will find a large part of their authors' travels was spent in seeing and studying with intelligence the achievements of architecture and the kindred arts. On their return they influenced that happy spirit of cultured design, good proportion and refined detail that you almost invariably see in eighteenth century work. At that time there was a definite tradition of design and craftsmanship throughout the whole country. If a house was built, however small, some simple formula was followed; good well-proportioned doors and windows; simple brickwork and tiled roof; a rational use of material that tended to produce a sense of quiet refinement that is sadly lacking to-day.

The late W. S. Gilbert never wrote a truer saying than when Bunthorne remarked in "Patience" that "Art stopped short at the cultivated court of the Empress Josephine"; and if you think it out the beginning of the nineteenth century did see the dying out of great craftsmanship and traditional design in architecture, and though much has been done, and is being done, to foster it again, it is, after all, but a sporadic effort. For remember that all great art is based on tradition, and however much you may wander in the seductive by-ways of so-called originality, you will ultimately return to the fold of traditional sanity. And this is where you young men can do so much to help. By your training you are taught to understand the meaning of team work, or, in other words, you are beginning to establish a tradition in architectural design, some settled method by which in the future the perpetuation of the trivialities we see on all sides would be impossible.

And now let me say that I think all of you young men are greatly to be congratulated in choosing a profession which is worthy of your enthusiasm and highest endeavour, and in the service of which no man can do better than devote his life. Indeed, I envy you. What would I not give to be standing where you are now with the future before you? I shall never forget the joy when at last I got my first job and watched its daily progress: the setting-out of the building site, the digging of the trenches for the foundations, the gradual rising of the walls, the covering of the whole by the roof, the fitting up of the internal details, and, finally, the whole work completed. And then how I wished that I could

rebuild it all over again quite differently ! This dissatisfaction with one's work, though discouraging, has often a salutary effect ; it is indeed a good plan when you begin to think yourself the last word as an architect to steady yourself by remembering the great men who went before.

When you set up in practice and things go wrong, as sometimes they are bound to do, in moments of despair you may feel that the bottom is falling out of everything. Never be discouraged. Work is the thing, and if you stick to your work and give it the attention which affection engenders you will certainly find, after waiting, one door open—it may be only a small and unimportant door but it will lead to the opening of others. Should you have a long time to wait between the intervals do not fret, for sooner or later work will come, as much as you want. Some of you may have ill-luck, and when you have reached the twilight of your days you may look back on your life as a failure. But remember the best of us are failures, and those of you who reach the goal at which you have aimed will know that the fun has not been in getting to the top but in the striving. For, as Dean Inge says, " Life is a game worth playing but the struggle is the prize."

Vote of Thanks to the President

Sir FRANK DICKSEE, P.R.A., in proposing a vote of thanks to the President for his address, said: I cannot help thinking that if you had selected a representative student to have proposed this resolution it would have been more appropriate, because the advice that has been given to you is so sound that, although we all greatly benefit by what we have heard, the students must do so in a much greater degree. The President has directed your attention more to the craftsmanship of your profession than to the artistic side. He warns you against being merely a cog in a wheel, and he not only warns you but he inspires you by example. We old men know that our advice is not generally taken, especially in the higher flights where those who have the vision naturally see more than those who only dream dreams ; but I think even the youngest here will admit that there is room for the older members to give advice to the younger. It is, of course, very difficult indeed to establish a tradition, and it seems to me that it is more difficult still in a country which is a democracy. Democracy is a necessity for us : we can have nothing else ; but it makes it a little difficult for some phases of art to manifest themselves in a full and satisfactory degree. All the fine specimens of arts which were mentioned by the President have been encouraged, and more or less created, by cultured and well-informed individuals in power—emperors, popes—men who have imbued themselves with tradition. It is very hard for the general public to venture to criticise architecture when they see the divided opinion among architects themselves. Any increased art education in the public, however, would be welcomed, I am sure, by every artist, and especially by an artist who is an architect. But how it is to be brought about I do not know. We can only do it by presenting fine examples of architecture to the public. But who is to initiate this ? It is left mostly to committees who are not much better informed than the ordinary public to select an architect for a building. Mistakes must be made in that way. We must hope and trust in the higher education of members of the public. I have been told—I do not know if it is the first time—that ladies have been successful in competitions this year. It would have been a charming incident this evening if, instead of the President of the Royal Academy, one out of the lady students had tendered this vote of thanks to the President.

Mr. J. WELLS, M.A., Warden of Wadham College and Vice-Chancellor, Oxford University, in seconding the vote of thanks, said : I re-echo Sir Frank Dicksee's wish that we had some of the successful lady students taking part in this vote of thanks.

I should like to illustrate what the President said as to being at times sparing in your decoration, trusting to the beauty of the lines of your building design and proportion. My own College, which others besides myself consider one of the most beautiful in Oxford, has this great distinction, that in the whole of it—it was finished in 1613—there is no piece of carved work anywhere on the stone except in the archway over the entrance hall. The whole of the rest of the building gains its beauty from the extreme simplicity of the lines and the lack of decoration.

The President pleased me greatly by laying stress upon the importance of tradition which is embodied in relics of the past. Too many of them are disappearing ; but they are still left, I think, in greater abundance in England than in almost any country in Western Europe. Our English villages, and many of our country towns, still preserve the beauty of the past, and surely there is no country in the world where the parish churches are so characteristic of the people and contain such an amount of artistic wealth. There is perhaps no suggestion which an outsider can more confidently give than to urge architects to make themselves familiar with the traditions which we have in our English churches. We are very apt to think that

what we want done must be done regardless of the past. Is it not a safe rule to say that where you have a building, whether it be a church, a guildhall or a cottage, which has been thought out and carefully built in the past, you should keep it, if it is strong and will hold together. Do not, on the ground that there is a crack here or a defect there, say, "Pull it down and let us build it up again." Some of our up-to-date people sixty years ago said that the Chapel of Exeter College was in danger and likely to fall down, and when they came to take it down and build a new one they had to use gunpowder. If a thing is useful still, and if it is done in the best way of the time, leave it. Your taste may be different now, but it is probable that your grandchildren may abuse your memory if you pull it down now and put up the newest thing.

I think Sir Frank Dicksee, in his admirable speech, took a rather too gloomy view of the part which democracy plays in the control of architecture. Is not there something to be said for the view that possibly democracy may give architecture its new chance? Do not we hope in the future that the money which democracy spends lavishly will be spent on buildings? Because, after all, buildings can appeal to the eyes of the many in a way that no other form of art can. May we not hope that the democracy of the future will not only ask for noble town halls, baths and bridges which will be for their use, but that they will also insist on having them put up in a beautiful form? May we not hope that the big town in the future, by fresh air and open spaces, by giving us good buildings for their proper use, will be more worthy of the great tradition of the past, and rather more beautiful than the towns of the present day?

The vote was put to the meeting by the Hon. Secretary and carried by acclamation.

Some Problems in the Construction of Buildings Considered Experimentally*

By E. G. COKER, M.A., D.Sc., F.R.S., M.Inst.C.E., Professor of Civil and Mechanical Engineering, University College, London.

IT is probably the experience of most architects, when designing a new building or altering an old one, that constructional problems arise for which no ready means of solution are known or can be devised from fundamental principles, and reliance must be placed on existing precedents in order to deal with a stress problem of a new type. Such difficulties are not likely to be less in the future, since buildings tend to increase in complexity, and especially so in cities where the business community finds it necessary to concentrate in a comparatively small area, and accommodation is needed for a very large number of people who require all the conveniences of modern life for the quick dispatch of business.

In recent years the want of such accommodation at a reasonable cost has been felt in the City of London and in many other places. This has led to suggestions for tall buildings in which constructional problems arise of great complexity. In a sense we are fortunate in that many of these problems have already been solved for us in other parts of the world, although new factors are bound to occur if very high buildings are constructed here similar to those found in New York and many other American and Canadian cities. Attention was drawn to some apparently simple problems during a recent alteration and extension of the Engineering Building at University College. These had to be settled at once as they arose, but references made at the time to standard works on building construction appeared to give little precise information concerning them, and if a solution was indicated it was generally either a rule of thumb method, of which the origin was difficult if not impossible to trace, and often of such simplicity that it seemed unlikely to have a very substantial basis.

As an instance of such simple solutions the case may be quoted of a brick wall in which it is desired to cut a rectangular window opening. Some text books state that the top of the window supports a triangular portion of the wall somewhat as shown by dotted lines in Fig. 1, but experiments described later indicate that the effects of stress here are more complex and not likely to be due to such a simple form of loading.

If we assume that such a load is borne by a beam of uniform transverse section with ends secured horizontally, it is easy to calculate the stress distribution on a lintel of span L considered as a beam without end fixing, from which the uniform contra-flexural bending moment M_o can be calculated. We find for this case that the bending moment

$$M_x = w\left(\frac{L^2x}{8} - \frac{x^3}{6}\right) \quad \text{or } x < \frac{L}{2}$$

gives

$$M_o = -\int_o^{L/2} (M_x \, . \, dx) \Big/ L/2 = -\frac{5}{192} wL^3$$

for the ends and for the central bending moment a value

$$M_c = \frac{3}{192} wL^3.$$

At distances of approximately ·22L from the ends the bending moment is zero. On these assumptions the stress distribution at the top and bottom faces of the lintel correspond in scale to the ordinates of the bending moment diagram, Fig. 1. This case has not been directly investigated here, but the more difficult cases analytically of monolithic structures have been experimentally examined by aid of transparent models in which it is found that the stress distributions at the horizontal contours of window openings show somewhat more complicated stress distributions of the same nature, which are, however, not independent of the total load borne upon them.

Another problem which appears to offer scope for investigation, as little information can apparently be found bearing upon it, relates to the way in which a load is distributed at the footings of a wall. This case presented itself when a floor of an old building was lowered several feet, thereby exposing the upper part of the footings and making access to the wall somewhat difficult. The question arose whether it was safe to cut away the projecting parts of the footings in such a manner as to leave an inclined surface, *A B* Fig. 2, on each side. The effect of this could not be ascertained at the time, and in order to avoid any risk the footings were built in and capped by wooden shelving, *C*, to form supports for light apparatus in this laboratory.

The two problems described here are typical of a number of others which were considered, and which appeared to be worth investigation by experimental means when a suitable opportunity occurred.

Direct experiments on masonry, brickwork and concrete structures are in general costly to carry out, and the results are often not capable of exact interpretation, since the probable distribution of the stresses is usually unknown beforehand and is extremely difficult to observe during the experiments. Whatever information can be gleaned is therefore obtainable from the final condition of the structure after failure has taken place. Fortunately it is not difficult to make experiments on models of walls, floors, pillars and like elements of buildings, in which the distribution of stress caused by loading can be followed with ease and accuracy nearly up to failure, and there appears to be a considerable field of work awaiting the investigator in this direction, of which the two cases selected are merely typical.

In order to illustrate a procedure which may be adopted for the examination of the stress distribution in buildings,

* Read at University College, Gower Street, on Thursday, 17 December 1925.

it will be convenient to illustrate the general principles of the mode of investigation followed here by reference to a specific case of a brick wall, Fig. 3, say 18 inches thick with a footing spread out to give a base of 36 inches width in three steps of 3 inches, horizontally and vertically. If a short length of this wall be taken resting on a flat surface below and loaded uniformly all over its upper surface above, it will be subjected to stress throughout very similar to that experienced in a long wall loaded in the same fashion, and at and near the footing the state of stress, at any point A along a line drawn through A

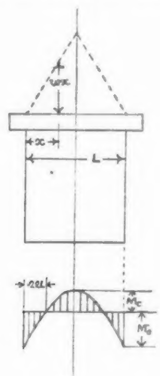


FIG. 1

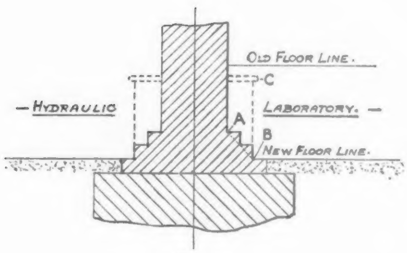


FIG. 2

perpendicular to the bounding faces, is sure to be somewhat complicated because the cross sectional area changes suddenly at definite intervals.

If now a model of this wall is constructed of transparent material and is viewed in a beam of polarized light, it is possible to find the average stress along the line through A, or along any other line parallel to it in this structure, because the loading causes the transparent material to become doubly refractive.

This temporary double refraction produced by loading is a valuable means of finding the state of stress in the interior of a transparent body, especially as the stresses found can be measured with an accuracy of say $\pm$ 2 per cent., if sufficient care is taken, and it is moreover capable of proof for bodies which conform to the elastic law that the stresses found in such models are the same as those experienced in similar monolithic structures of similar shape loaded in the same fashion.

It is therefore of interest to describe in some detail what takes place when a beam of plane polarized light A traverses the model. This beam is represented conventionally as a wave P vibrating transversely in a definite plane passing through its line of direction, and when it reaches the model its further progress takes place through material which along the line through A is subjected to a state of stress which may be represented by a pair of stresses acting normally to a pair of opposite faces of a rectangular prism of square cross section, having this line as its axis, the other two faces being, in general, stressed by another pair of normal stresses q. The effect of these stresses is to cause the single wave P to break up into two waves, one of which undulates in the direction of the stress system p and the other in the direction q.

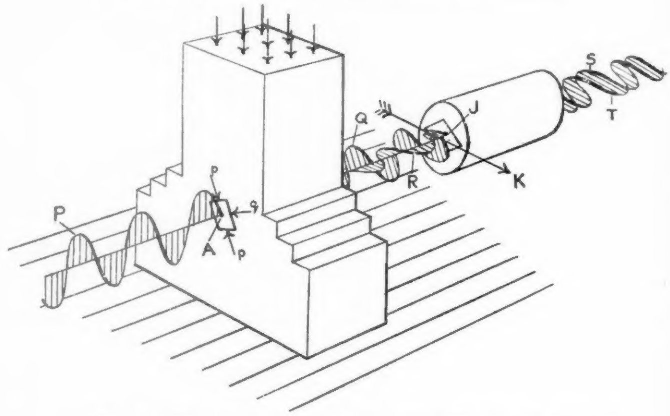


FIG. 3.—DIAGRAM OF THE PASSAGE OF A POLARIZED BEAM OF LIGHT THROUGH A PLATE OF STRESSED MATERIAL

In addition, each wave is retarded by the action of the stresses, one proportionally to the stress p and the other proportionally to the stress q. Hence the emergent beam consists of two waves Q and R vibrating at right angles to one another, and one is also in advance of the other proportionally to the difference $(p-q)$.

Now plane waves of light at right angles have no effect upon each other which is visible to the eye, and in order to produce such an effect a crystal of Iceland spar J is interposed, which selects such components of these emerging waves as are parallel to the direction of the arrow passing through the opposite angles of the crystal. The remainder of the light is rejected by this crystal, which latter, however, does not alter the relative retardation of the component waves. When these component waves S and T emerge, they are able to cause interference which is visible to the eye as a colour effect, and when white light is employed for the initial beam a set of prismatic colours mark the numerical difference between the stresses p and q over the area viewed. It is usually convenient to express the values of $(p-q)$ so obtained by comparing them with the colour effects produced in a member of the same

thickness subjected to simple compression or simple tension, whichever may be most convenient. If the stress is this latter member is r when its colour effects exactly match those at A, we have

$$r = p - q.$$

Further, if we wish to obtain p and q separately, it is a comparatively simple matter to do so by measuring the change in length of the line through A, since this change is proportional to the added effects of p and q. If this change is referred to the standard member already used for the optical measurement, and it is found that a stress s in it gives the same lateral change in thickness, as is produced in $A\ B$, we have

$$s = p + q$$

and therefore

$$p = \tfrac{1}{2}(r+s) \text{ and } q = \tfrac{1}{2}(s-r)$$

We have therefore arrived at the values of both p and q by aid of two simple measurements, but we do not yet know their actual directions.

These latter are, however, not difficult to obtain, for if the incident light is vibrating in the direction of either of the stresses p and q, and the prism J has its angular position adjusted so that only waves vibrating at right angles to the incident beam can pass through, then all light is stopped along the line through A and a black dot is shown on the projected image, and the arrow gives the directions of both p and q, since

$$\theta_p \sim \theta_q = \frac{\pi}{2}$$

For any one position of the arrow K it is usual to find that there is an aggregation of these black dots on a specimen forming bands of varying shape, which indicate that along any one of these all the stresses are in the same direction. In the example chosen for illustration it is in fact found that these bands have the forms shown in Fig. 4, so that, for example, the band marked 75° indicates all the places on the specimen where the stress is inclined at that angle to the base, and similarly for any other band. The outermost one marked 90° indicates that all the stresses on this line are perpendicular to the base, and in this case it will be found that this curve is also a boundary line such that all the directions of stress in the area above and in the area below are all perpendicular to the base, for these areas show a black field of view when the polarising and analysing prisms are set vertically and horizontally respectively. In experimental work it is necessary to set the reference member in the direction of the stress, and it is therefore convenient to have a map of their directions, which is easier to use than the black bands on the left half of Fig. 4.

If we assume conventionally that uniform stress in the upper part of the specimen is represented by lines equally spaced, and these are allowed to thread their way through to the base, the directions to be taken are indicated by the black bands and a map is obtained as shown in the right hand of Fig. 4, which is very convenient for use. These latter curves may be looked upon as "lines of stress," for a stress acts along them at any point, and it changes its magnitude from point to point. There are, in fact, two such sets of curves mutually perpendicular to each other, forming a mesh or network giving the lines of push and pull in any given case of a plate loaded by forces in its own plane.

It is worth while pointing out that the main value of such experimental measurements of the stress distribution in a plate model arises from the fact that the stresses as measured are the average of the stresses along a line perpendicular to the faces of the plate and passing through any point A, and unless the plate is very thick the variation in the stress condition across the thickness is small, so that the stresses for all practical purposes are those at a point. Each set of three measurements giving p and q, and their directions, is also independent of those obtained at any other point and also of any theory of their distribution and variation.

We may now turn to the problem in hand of determining the distribution of stress in a monolithic footing for a wall which is taken for convenience as 18 inches thick, spread out to 36 inches by stepped intervals of 4½ inches horizontally and vertically. This wall is represented by a small model, Fig. 5, cut from a sheet of nitrocellulose as a convenient material for observation, since it shows marked optical effects under stress.

The model is loaded in a special form of press, which is capable of exerting a very accurately applied compression load upon the end faces. The effect of applying load between two plane faces of different materials introduces, however, some local disturbances at the areas of contact, and an even distribution of stress is only possible at a small distance away from the pressure plates of the machine, unless these latter are made of the same material and are exactly of the same size as the ends of the model. In this case the ends rest directly on steel plates, and if the model is viewed in a field of polarised light these local disturbances are easily perceived to die away rapidly, and the colours observed at a short distance from the surfaces of separation indicate uniform loading near each end.

The most important matter is to determine the maximum intensity of stress and its position, and, as may be readily seen from optical experiment, the maximum stress occurs at the ends of the junction of the wall with the footing. Indeed, nowhere else does the stress intensity approach that found at these points. In order to determine the distribution here, advantage is taken of the fact that one principal stress is zero at the contour, and to trace the variation in intensity of the other the movement of the purple blue band is observed for different loads, and where it intersects the contour the stress for a definite load is obtained by simple proportion. A total load of forty-four pounds on the specimen, giving an average distribution on the upper part of the model of 587 pounds per square inch, is found to produce a maximum intensity of 1,785 pounds per square inch at a point just below the line of junction of the wall with the footing, and on the curved fillet of 1-32 inches radius. The use of curves at re-entrant angles in this and other cases is to avoid the occurrence of very great stress which a load may produce at these angles if practical conditions are faithfully represented. The variation of stress intensity throughout is indicated by ordinates to the face of the wall and gives a curve of stress distribution $A\ B\ C$, Fig. 6, which intersects the

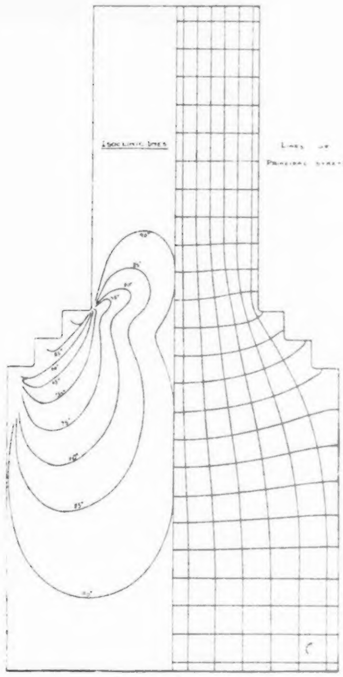


FIG. 4.—ISOCLINICS AND LINES OF PRINCIPAL STRESS IN A STEPPED FOOTING

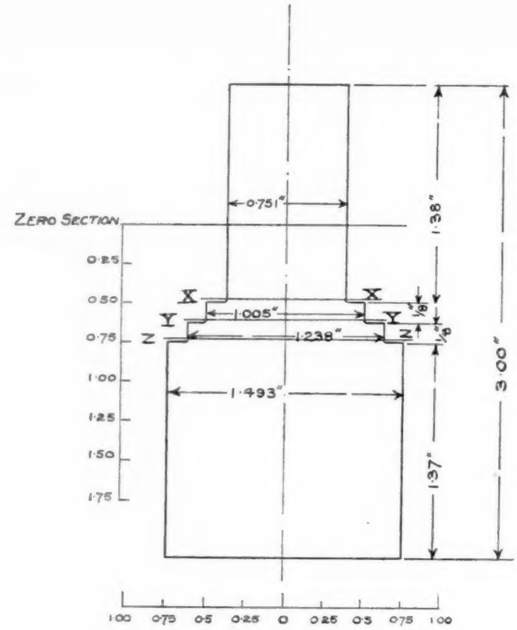


FIG. 5.—MODEL OF A STEPPED FOOTING

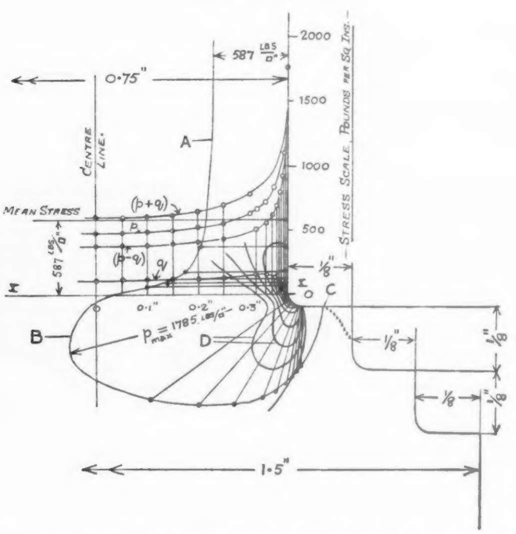


FIG. 6.—STRESS DISTRIBUTION OF THE CONTOUR AND AT THE SECTION XX OF A STEPPED FOOTING

base at *C*, where the stress is zero. It is also zero in the approximately triangular area indicated close to the point *C*.

The method of measurement is also illustrated by the inclusion of a few of the purple blue bands *D* used, from which points on the curve of distribution are found as indicated in the figure.

In order to determine the stress distribution across a horizontal section, an addition to this procedure is necessary, for here both the principal stresses p and q must be found and, moreover, they intersect the section at varying angles throughout as the lines of principal stress on Fig. 4 indicate. One way of finding p and q is to measure $(p-q)$ optically, and $(p+q)$ by observations of the change of thickness under load. A tension or comparison member cut from the same plate and under suitably varied tension then serves to calibrate both sets of measurements.

This involves a set of measurements of $(p \pm q)$, the results of which are recorded in the accompanying Table I, from which it is now possible to separate the constituents p and q, and it is then found that there is (in addition to a nearly normal stress p, indicated in Fig. 6 as lying midway between the $(p+q)$ curves) a variable cross stress q which rises from a value of about 110 pounds per square inch at the centre to a maximum value of about 170 pounds per square inch near the ends of the section and falling to zero at the contour. At every point, except the end ones, we have in fact a pair of principal stresses

STRESS DISTRIBUTION AT THE XX SECTION OF THE STEPPED FOOTING.

DIST.^{CE} FROM CENRE LINE (INS.)	θ DEGREES	STRESSES IN POUNDS PER SQ. INS. $(p+q)$	$(p-q)$	p	q	$p\cos^2\theta$	$q\sin^2\theta$	p_n	$\frac{\Sigma(p_n)}{x}$ LBS/SQ.IN.	p_{mean} LBS. PER SQ. IN.	ERROR PER CENT.
0.00	0	600	375	488	112	488	0	488			
0.05	0.7	600	375	488	112	488	0	488			
0.10	2.3	615	375	495	120	495	0	495			
0.15	4.6	620	390	505	115	501	1	502			
0.20	7.0	650	405	528	122	519	2	521			
0.25	10.5	700	430	565	135	546	5	551			
0.29	13.0	775	475	625	150	593	8	601			
0.30	13.8	785	490	638	147	600	9	609		$\frac{44}{0.75\times0.1}$	
0.316	16.0	825	515	670	155	624	10	634	575	=587	-2.2
0.336	17.0	900	570	735	165	670	14	684			
0.345	—	955	630	792	163	—	—	—			
0.354	—	1035	700	867	168	—	—	—			
0.360	—	1125	800	965	165	—	—	—			
0.365	—	1255	925	1090	165	—	—	—			
0.368	—	1370	1105	1238	132	—	—	—			
0.371	—	1500	1365	1432	68	—	—	—			
0.375	—	1785	1785	1785	0	1785	0	1785			

TABLE I

STRESS DISTRIBUTION AT THE SECTION XX OF THE MODIFIED FOOTING.

DIST^{CE} FROM CENTRE (INS.)	θ DEGREES	STRESSES IN POUNDS PER SQ INS. $(p+q)$	$(p-q)$	p	q	$p\cos^2\theta$	$q\sin^2\theta$	p_n	$\frac{\Sigma p_n}{L}$	p_{mean} LBS PER SQ INS.	ERROR PER CENT.
0·00	0	600	375	488	113	488	0	488			
0·05	1·0°	605	375	488	113	488	0	488			
0·10	2·4°	605	380	495	110	493	0	493			
0·15	3·3°	625	385	505	120	502	1	503			
0·20	7·0	660	420	540	120	534	2	536			
0·25	10·0	715	445	580	135	563	4	567		$\frac{44}{\cdot752\times\cdot10}$	
0·275	–	–	465	–	–	–	–	–	579	=585	-1.0
0·30	14·5	805	495	650	155	609	10	619			
0·302	—	—	505	-	—	—	—	—			
0·325	—	—	555	—	—	—	—	—			
0·340	—	—	620	—	—	—	—	—			
0·350	22.0	965	710	833	127	740	18	758			
0·358	—	—	815	–	—	—	—	—			
0·364	—	—	970	—	—	—	—	—			
0·369	—	—	1180	—	—	—	—	—			
0·376	16·3	1640	1640	1640	0	1510	0	1510			

TABLE II

acting across the section, and their resolved sum in the vertical direction equals the total load *P*.

This sum can easily be shown to be

$$p = \Sigma\, p_n \,.\, \delta s = \Sigma(p \cos^2 \theta + q \sin^2 \theta)\ \delta s$$

Where θ is the inclination of a stress to the vertical, δs is the element of area of the cross section and p_n is the normal load upon it. We have, therefore, an opportunity of ascertaining the general accuracy of the measurements by graphically integrating the area between the base and the curve of normal distribution p_n, obtained experimentally, and comparing it with the area given

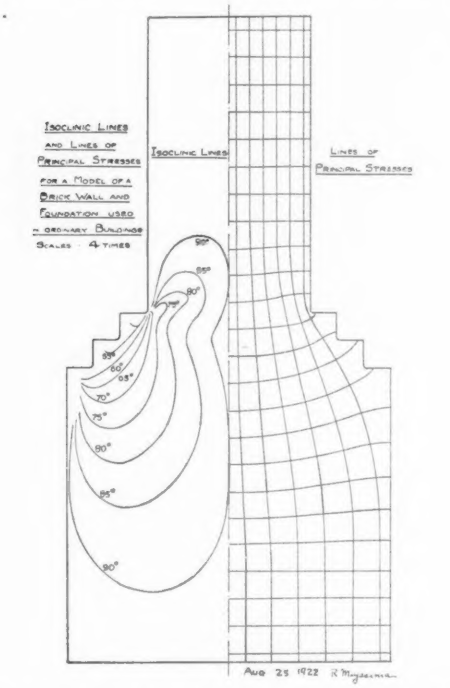


FIG. 7.—ISOCLINICS AND LINES OF PRINCIPAL STRESS IN MODIFIED FOOTING

by the mean average value of 587 pounds per square inch due to the applied load. The figures for this comparison are included in Table I, and it is found that the mean value of p_n as measured is 575 pounds per square inch, giving an error of 2·2 per cent. in defect, which represents careful work on the part of the observer, Mr. R. Miyasima, for this type of measurement.

It will now be of interest to examine the question of the effect of cutting away the stepped footings to give a sloping contour of 45°, as this problem was the starting point of this investigation, as described above. Colour photographs show that the projecting angles of the steps are under no stress, since a dark field is observed there similar to the background, which does not change under load, although the re-entrant angles are under stress which diminishes in intensity with the spread of the base. It seems probable, therefore, that the removal of the parts under no stress will not alter the distribution very much, even although this process involves a cut along a line tangential to the re-entrant angles.

Even in a footing so drastically modified, only slight changes take place in the directions of the lines of principal stress, as is shown by Fig. 7, in which these directions are plotted to correspond with Fig. 4.

Proceeding exactly in the same manner as before, the contour stress is determined and is plotted on the accompanying Fig. 8, from which it will be noticed with the assistance of the measurements contained in Table II, that with a slightly lower average stress of

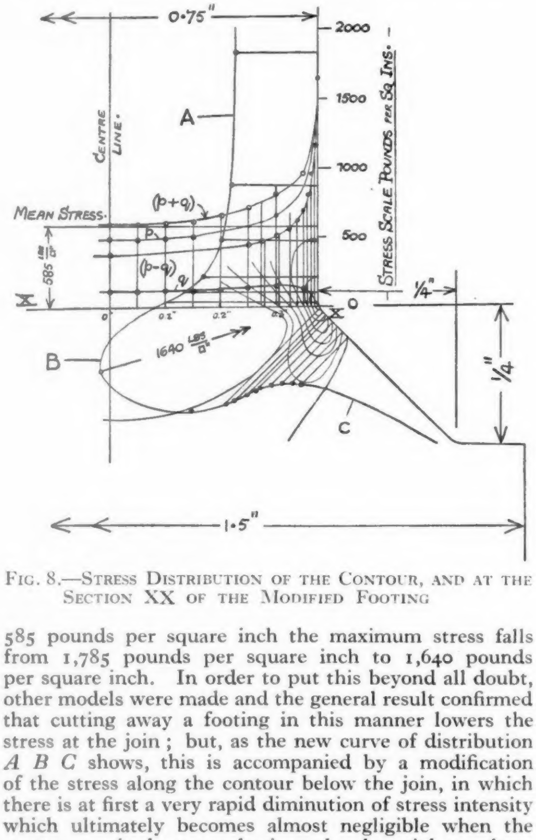


FIG. 8.—STRESS DISTRIBUTION OF THE CONTOUR, AND AT THE SECTION XX OF THE MODIFIED FOOTING

585 pounds per square inch the maximum stress falls from 1,785 pounds per square inch to 1,640 pounds per square inch. In order to put this beyond all doubt, other models were made and the general result confirmed that cutting away a footing in this manner lowers the stress at the join; but, as the new curve of distribution *A B C* shows, this is accompanied by a modification of the stress along the contour below the join, in which there is at first a very rapid diminution of stress intensity which ultimately becomes almost negligible when the contour again becomes horizontal. As might perhaps be expected, the stress distribution across the section XX shows very little change, but it has a slight tendency to more equable distribution owing to the end maxima being less pronounced. In this case the general accuracy of the measurements is somewhat improved (Table II), as 99 per cent. of the load is accounted for.

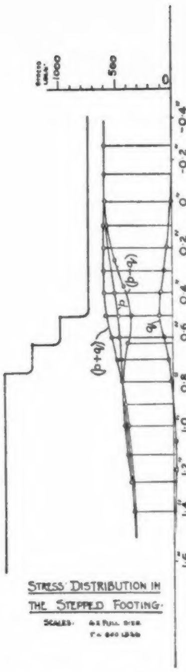


FIG. 9.—STRESS DISTRIBUTION ALONG THE AXIAL LINE OF THE STEPPED FOOTING

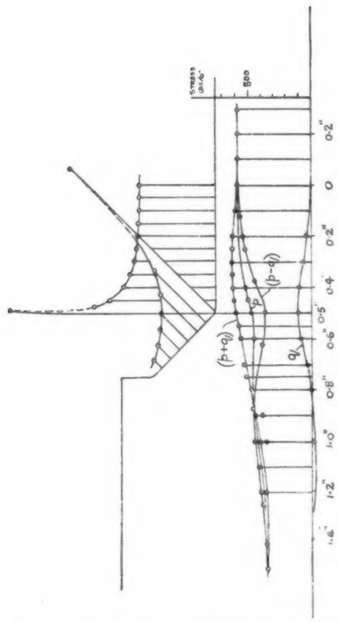


FIG. 10.—STRESS DISTRIBUTION ALONG THE AXIAL LINE OF THE MODIFIED FOOTING

STRESS DISTRIBUTION ALONG CENTRAL LINE OF STEPPED FOOTING.

y Ins	Stresses in Pounds per Sq Ins.				y (Ins)	Stresses in Pounds per Sq Ins			
	$(p-q)$	$(p+q)$	p	q		$(p-q)$	$(p+q)$	p	q
−·375	587	–	–	–	+·625	–	–	–	–
−·250	587	587	587	0	·700	420	480	450	30
−·125	587	587	587	0	·750	425	–	–	–
0	587	587	587	0	·800	435	445	440	5
+·100	587	590	587	2	·875	430	–	–	–
+·125	580	587	585	3	·900	440	420	430	−10
+·200	550	600	575	25	1·000	430	395	413	−18
·250	515	–	–	–					
·300	490	600	545	55					
·375	425	-	-	-					
·400	420	600	510	90					
·500	365	590	480	90					
·600	390	530	460	70					

TABLE III

Although the chief interest in these two problems is in the place of maximum stress there are various other stress distributions which may claim our attention, and one of these is the stress distribution along the longitudinal central section of the wall footing.

The effect of the external contour upon this is unlikely to be very great, although it may be appreciable, while the more or less abrupt change of section tends to produce cross stress. There is no means here of checking the accuracy of measurement except from the general consideration, already stated, that for the same distributed load it is to be expected that very similar distributions will be found which will only differ as regards their minor characteristics owing to the distance of the contours from the section, and this proves to be the case.

In the stepped footing cross compression stress q begins to appear in the wall well above the footing, and attains its maximum value at or near the junction, Fig. 9; it then decreases in value and ultimately becomes zero at a point rather below the junction of the footing with the base. The main longitudinal stress p shows a gradual diminution of stress as it passes through the region of discontinuity from 587 pounds per square inch to values which are influenced and raised by the end contact pressures (Table III).

In the case of the modified footing, distributions are found of much the same kind (Fig. 10 and Table IV), thus confirming the view that for this longitudinal section the influence of the contour is practically negligible and that the cross stress, although small numerically, extends a considerable distance into the wall itself.

The stress distributions at other horizontal sections of the stepped footing are also of interest, but are more difficult to determine, as their average values are low. It was found necessary to increase the load on the model to give an average value of 1,470 pounds per square inch on the upper section in order to determine the stress intensity at the lower sections. In the stepped footing this produced some relative change at the section X X, Fig. 6, as the maximum stresses tended to produce some permanent deformation which would tend to alter the stress distribution in its neighbourhood; but as the whole of the stress across the section was accounted for on the section Y Y, Fig. 5, it is probable that the error is not very large.

The resulting distribution, Fig. 11, shows the interesting result that the vertical stress p_n across the section rises to a maximum inside the model, due to the sudden discontinuity of the contour at $\pm$ ·5 inch and its serrated outline. It will also be noticed that the cross stress is relatively small.

At the section Z Z, Fig. 5, an integration of the normal stress p_n accounts for 97 per cent of the total load. It has a non-uniform distribution of rather more than 1,100 lbs. per square inch over the central part, Fig. 12, with increased values at points distant $\pm$ ·26 inches from the centre and then falls rapidly and almost linearly to the contour value, which is here very small and has a maximum intensity of about 120 pounds per square inch. The cross stress q is very small and uniform, with a value of about 50 pounds per square inch for this load, which for this section has an average value of 880 pounds per square inch.

The distribution across various sections of the modified footing have a certain amount of resemblance to the former. Thus in the model at a point 1·20 inch below the junction with the wall it is found that the stress dis-

STRESS DISTRIBUTION ALONG CENTRAL AXIS OF THE MODIFIED FOOTING.

y Ins.	Stresses, Lbs per Sq Ins.			
	$(p-q)$	$(p+q)$	p	q
−·3	587	587	587	0
−·2	587	537	587	0
−·1	587	537	587	0
0	580	587	584	3
+·1	580	590	585	5
+·125	565	605	582	23
·20	550	625	588	37
·25	530	625	577	48
·30	500	630	565	65
35	470	630	550	80
·375	455	640	548	92
·40	430	615	523	92
·45	400	620	510	110
·50	370	590	480	110
·55	370	570	470	100
·60	380	550	465	85
·625	375	545	460	85
·650	400	500	450	50
·70	415	560	488	52
·75	428	535	482	54
·80	430	475	452	23
·875	465	450	458	−8
·90	440	445	442	+3
1·00	445	420	433	−13
1·10	420	400	410	−10
1·125	425	380	398	−18
1·20	405	370	388	−18
1·25	390	355	378	−18
1 40	360	345	353	−8

TABLE IV

tribution is of the form shown by Fig. 13 when under a load of 222 pounds. Here the maximum stresses are in the interior of the footing at points ·085 inches from the ends of the cross section of the model, and these are accompanied by cross stresses of relatively small magnitude with maxima at about the same point.

The tendency in this footing as in the other is for the stress to concentrate towards the centre, as colour photographs show.

Similar results have been obtained* in tension members with enlarged ends when the joins are made by arcs of circles.

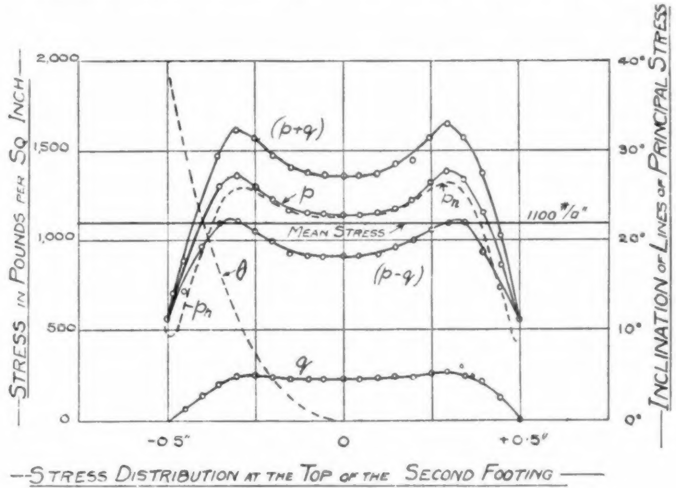


FIG. 11.—STRESS DISTRIBUTION AT THE CROSS SECTION YY OF THE STEPPED FOOTING OF FIG. 5

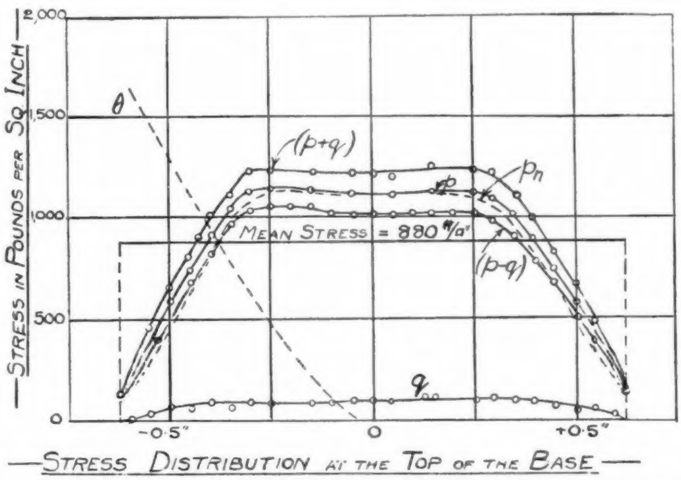


FIG. 12.—STRESS DISTRIBUTION AT THE CROSS SECTION ZZ OF THE STEPPED FOOTING OF FIG. 5

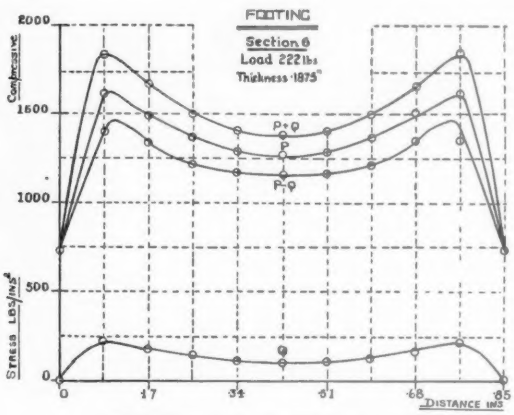
* " Photo-Elastic Measurements of the Stress Distribution in Tension Members used in the Testing of Materials," by Prof. E. G. Coker, Min. Proc. Institution of Civil Engineers, vol. ccviii, 1918-19, part ii.

STRESS DISTRIBUTION IN AN UNSYMMETRICAL FOOTING

In some cases it is desirable and necessary to increase the basal area of a wall by footings on one side only, and this gives a cross section of an unsymmetrical character, which is of interest and importance in practical construction. It is evident that in such a case the effect of loading one end uniformly will cause a non-uniform contact loading at the other, and in general an unsymmetrical stress distribution.

An opportunity was taken of examining one case by

cutting off one side of the stepped footing of Fig. 5, giving a model having the dimensions of Fig. 14, with end faces plane and truly parallel, and loaded in a testing machine



DIST	P+Q	P−Q	P	Q	θ	$P\cos^2\theta$	$Q\sin^2\theta$	Fh
0	740	740	740	0	45	320	0	320
·085	1840	1380	1620	220	17	1481	19	1500
·17	1660	1340	1500	160	7	1478	2	1480
·255	1510	1210	1360	150	3	1356	·2	1356
·34	1400	1160	1280	120	1	1279	·04	1279
·425	1380	1150	1265	115	0	1265	0	1265
·51	1400	1160	1280	120	1	1279	·04	1279
·595	1510	1210	1360	150	3	1356	·2	1356
·68	1660	1340	1500	160	7	1478	2	1480
·765	1840	1380	1620	220	17	1481	19	1500
·85	740	740	740	0	45	320	0	320

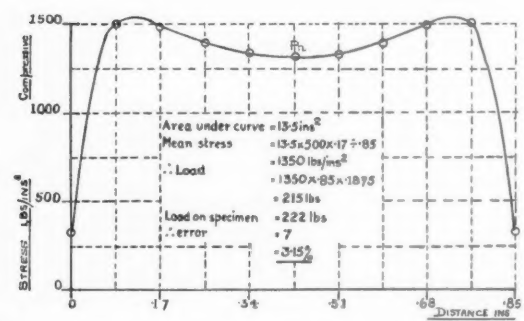


FIG. 13.—STRESS DISTRIBUTION IN THE MODIFIED FOOTING $\frac{1}{20}$ INCH BELOW

with metal end pressure plates also kept truly parallel. The conditions of loading are therefore not such as to give uniform pressures at either end, but are rather such as to tend to the production of strains in the model which, when summed vertically, shorten the model by equal amounts at any vertical section provided contact is maintained over the end faces. This condition of loading is no doubt affected by the length of the model and the position of the change of section with reference to the ends, so that the applications of these stress measurements to practical problems of a similar nature are strictly limited, but the results are useful in forming a general idea of this type of wall problem. Under this system of load, or rather strain, the isoclinics and lines of principal stress differ a good deal from the symmetrical case, as Figs. 15 and 16 show, and an optical examination indicates that the greatest intensity of stress is still found at the join of the wall to the footing

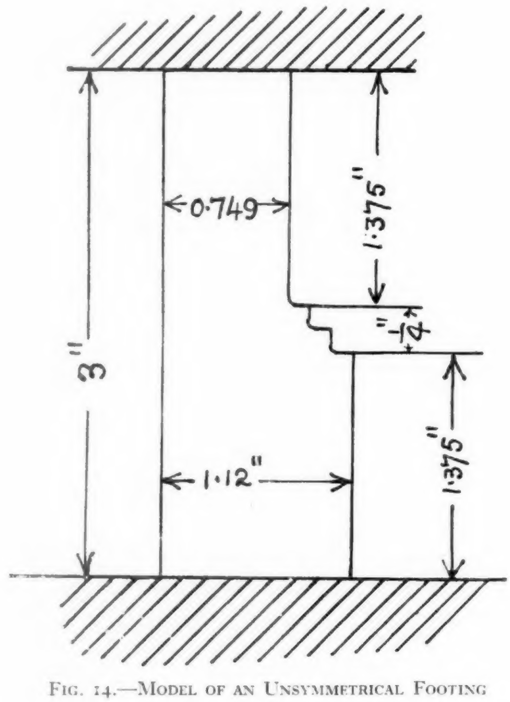


FIG. 14.—MODEL OF AN UNSYMMETRICAL FOOTING

where a break of section occurs. As this cross section is clearly the most important one, it has been examined somewhat carefully, and the measurements of Fig. 17 and Table V show that for a mean average stress of 587 pounds per square inch the maximum stress is 1,450 pounds per square inch on one side and falls to 460 lbs. per square inch on the other, but the fall from the maximum is very rapid and is practically complete in a horizontal distance of ·2 inches, measured along the section. The cross stress q is not very important, as the measurements indicate, since it only reaches a maximum value of 160 lbs. per square inch at ·05 inches from the left hand contour. All the load is accounted for in these measurements, Table V, and the probability is that the individual measurements are of a high order of accuracy.

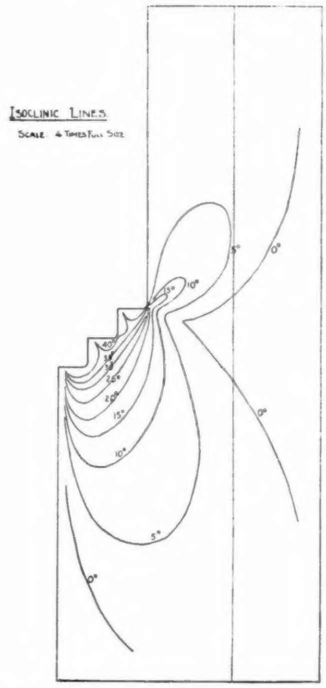


FIG. 15.—ISOCLINICS OF MODIFIED STEPPED FOOTING

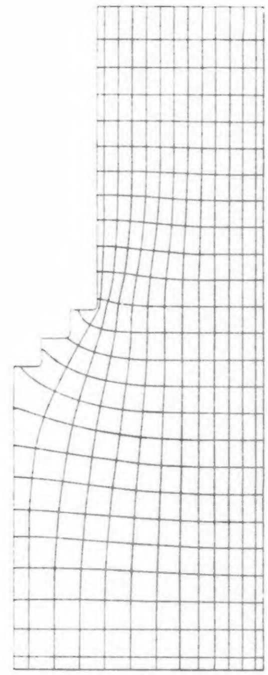


FIG. 16.—LINES OF PRINCIPAL STRESS OF MODIFIED STEPPED FOOTING

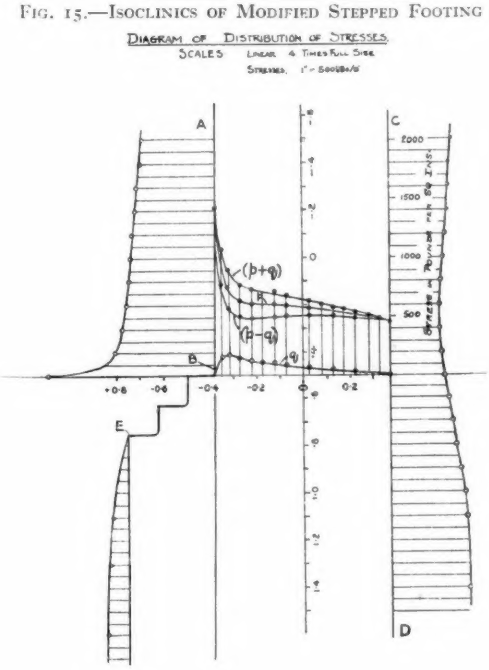


FIG. 17.—STRESS DISTRIBUTION IN MODIFIED STEPPED FOOTING

It will be noted that the stress along the contour from *A* to *B* is rising in value along the whole length measured, and on the contour *C D* there is a minimum value above the change of cross section and that the stress increases continuously in each direction from this point, but attains a greater value at the base. On the side *E F* the stress is naturally enough very small.

It is probable that a number of other problems of this type might be worth examination.

STRESS DISTRIBUTIONS DUE TO SUDDEN CHANGES IN THE CROSS SECTIONS OF WALLS CAUSED BY WINDOWS AND DOORWAYS.

The planning of buildings to give access of light and for easy communications involve discontinuities in the structure, which cause considerable local increases of stress. These are provided for in various ways by cross-girders, segmental arches and other well-known devices. The practical experience due to many centuries of use gives the constructor great confidence in the safety and stability of his designs, which is, as a rule, amply justified, although he may not know very accurately what are the stresses he has to provide for, nor is it possible in most cases to calculate them with any great accuracy. Economy in the use of material is therefore not so possible as it might be if there was a complete knowledge of the actual stress distributions.

It is not possible here to consider this question in detail, owing to the variety and extent of the problems which present themselves, but as illustrations of the applications

of photo-elastic investigation two problems are considered of the effect of cutting rectangular openings in a wall in which for simplicity and to avoid stresses which would cause failure in the material the angles are rounded off to a definite radius. It would be possible to examine the effects of cross girders, segmental arches and the like above the openings, and some suggestions for the treatment of such cases are made later.

As a commencement of such an investigation we may take a rudimentary case of a square hole in a wall, Fig. 18, of limited width to suit the stressing appliances available. The effect of a direct compression load uniformly distributed over the end faces is to cause great local concentration of stress at the angles, as a colour photograph shows, and this must clearly be so, since the lines of stress have to pass around the discontinuity

STRESS DISTRIBUTION ALONG 0·5" HORIZONTAL LINE

x INS	θ°	STRESSES IN POUNDS PER SQUARE INCH.							$\frac{p_n}{L}$	APPLIED LOAD LBS/□"	ERROR PER CENT.
		$(p-q)$	$(p+q)$	p	q	$p\cos^2\theta$	$q\sin^2\theta$	p_n			
0·375	0°	460	460	460	0	460	0	460			
0·325	"	465	475	470	5	470	"	470			
0·275	"	470	500	485	15	485	"	485			
0·225	"	495	535	515	20	515	"	515			
0·175	"	495	555	525	30	525	"	525			
0·125	"	515	565	540	25	540	"	540			
0·075	"	510	600	555	45	555	"	555			
0·025	"	510	640	575	65	575	"	575	587	587	0
-0·025	0·3°	480	670	575	95	575	"	575			
-0·075	0·6°	500	665	583	82	583	"	583			
-0·125	1·3°	505	720	612	108	612	"	612			
-0·175	2·5°	490	710	600	110	598	"	598			
-0·225	4·0°	495	725	610	115	604	1·0	605			
-0·275	6·0°	500	770	635	135	628	2·0	630			
-0·325	9·0°	580	900	740	160	721	4·0	725			
-0·350	16·0	780	1070	925	145	861	10·0	871			
-0·375		1450	1450	1450	0	1450	0	1450			

CONTOUR STRESSES AT PLANE EDGE

y INS	-0·5	-0·4	-0·3	-0·2	-0·1	0	0·1	0·2	0·3	0·4	0·5	0·6	0·7	0·8	0·9	1·0	1·1	1·4
p IN LBS/□"	530	500	500	485	470	445	435	425	420	450	465	505	525	570	605	640	640	665

CONTOUR STRESSES AT STEPPED EDGE

y INS.	-0·5	-0·4	-0·3	-0·2	-0·1	0	0·1	0·2	0·3	0·4	0·5	—	1·1	1·3	1·6
p IN LBS/□"	620	650	675	685	720	725	740	765	815	870	1450	—	146	165	180

TABLE V

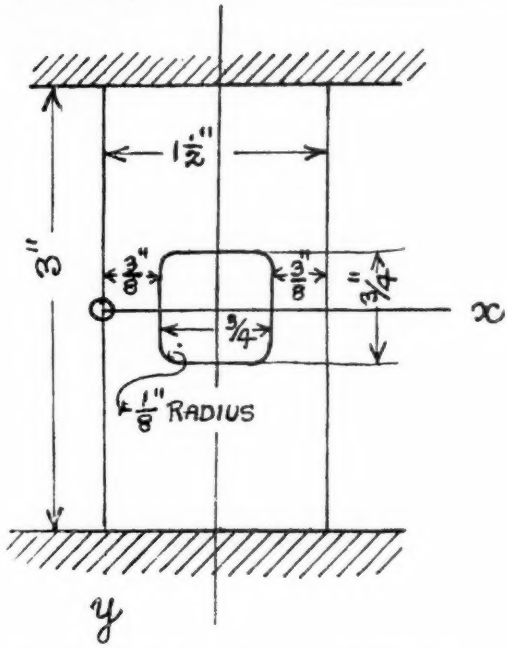


FIG. 18.—MODEL OF A WALL OF LIMITED WIDTH PIERCED BY A SQUARE HOLE WITH ROUNDED CORNERS

caused by this opening and they tend to crowd together at the angles.

Their directions in this example are indicated in the accompanying Fig. 19, together with the isoclinics, from which they are derived. An exploration of the stress at the inner contour, Table VI and Fig. 20, shows that along the vertical sides the stress at every point is greatly above the average mean stress of 587 pounds per square inch, and rises to a maximum of about 1,110 lbs. per square inch at a point where a tangent to the contour makes an angle of 6·1° with the vertical and then diminishes very rapidly and becomes an appreciable tension along the horizontal boundary, with a maximum value of 385 pounds per square inch at the centre of this line. Across the central horizontal section the normal stress p is almost linearly variable and in consequence the cross stress q is negligible. The details of the measurements here show that 97·4 per cent. of the load is accounted for. It is also worth remarking that along the outer contours the stress is a minimum at the ends of the central horizontal cross section, and rises to its maximum value well below the discontinuity, as is indicated by the colour bands. This general result is also found in other cases, as for example when a round hole pierces a plate of limited width.

If a similar plate is now pierced by two rectangular holes, the distribution of stress may be readily obtained in a similar manner, and Fig. 21 shows the lines of stress for this case, in which, as may be seen from a colour photograph, the central part of the member is mainly in pure compression for most of its length, and the side walls are under variable stress as in the earlier example, accompanied by great local stress concentration at the angles.

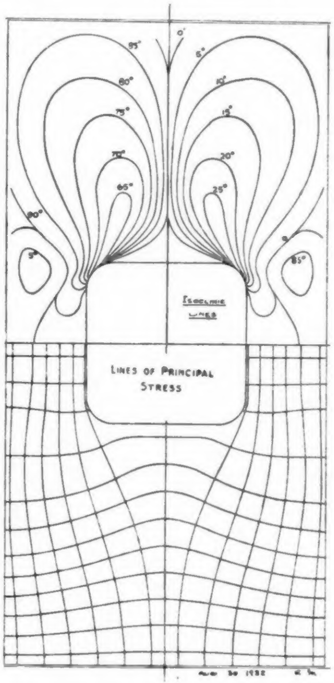


FIG. 19.—ISOCLINICS AND LINES OF PRINCIPAL STRESS IN THE MODEL OF FIG. 18

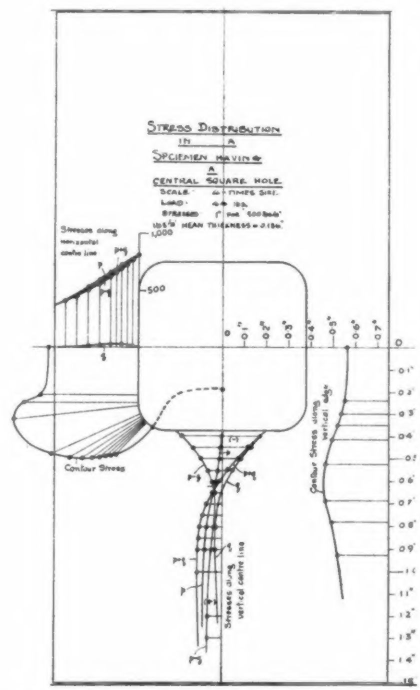


FIG. 20.—STRESS DISTRIBUTION IN THE MODEL OF FIG. 18

The detailed measurements are shown in Fig. 22, from which it may be observed that at the central cross section for an average load of 587 pounds per square inch the stress is quite uniform and has a value of 720 pounds per square inch, while in the side walls the stress varies almost linearly from 760 lbs. per square inch at the inner contour to 400 lbs. per square inch at the outer. In these cases the cross stress is negligible. The mean accuracy of the measurements, as determined by an integration of the stress areas, is 2·2 per cent. in excess. We may infer that in a long

STRESS DISTRIBUTION AT CENTRAL CROSS SECTION + = COMPN.

x Ins.	Stresses in Pounds per Square Inch. $(p-q)$	$(p+q)$	p	q	$\frac{\Sigma p}{x}$	p_{mean}	Error per cent.
0	365	366	365	0			
0·050	395	410	403	8			
0·085	430	450	440	10			
0·100	450	470	460	10			
0·125	465	505	485	20			
0·150	500	530	515	15			
0·166	515	555	535	20	572	587	-2·6
0·200	550	600	575	25			
0·216	575	625	600	26			
0·250	615	665	640	25			
0·275	640	710	675	35			
0·300	690	730	710	20			
0·338	735	785	760	25			
0·350	765	785	775	10			
0·375	800	800	800	0			

STRESS DISTRIBUTION ALONG VERTICAL CENTRE LINE + = COMPN. − = TENSION.

y Ins.	Stresses in Pounds per Square Inch. $(p-q)$	$(p+q)$	p	q
0·375	+386	-386	-·0	-385
0·400	-350	-330	+10	-320
0·450	-255	-235	+10	-250
0.500	-185	-140	+23	-117
0.550	120	-50	+35	-85
0.600	85	+25	+55	-30
0.650	55	+85	+70	+15
0·700	—	+140	—	—
0.750	—	+170	—	—
0.800	77	+200	+139	+61
0.850	—	+210	—	—
0.900	95	+220	+158	+62
0.950	—	+220	—	—
1.000	—	+220	—	—
1.100	110	—	—	—
1.200	125	—	—	—
1.300	135	—	—	—

CONTOUR STRESSES AT INNER BOUNDARY.

y Ins.	0	0·214	0·25	—	—	—	—	—	—	—	—	—
θ	—	—	0	6·1°	23·8°	29·1°	33·2°	37·1°	39·5°	41·4°	43·7°	45·5°
p	800	850	1015	1110	850	785	640	575	515	465	430	395

CONTOUR STRESSES ALONG VERTICAL OUTER BOUNDARY.

y Ins.	0	0·238	0·288	0·338	0·394	0·490	0·645	0·750	0·925
p	365	395	430	465	515	575	575	515	465

TABLE VI

line of windows distributed at equal intervals the intermediate brickwork or masonry is uniformly stressed, but the end wall will experience a uniformly varying stress of the type shown in this case. It is also to be noted that the contour stress of the window opening is greater at the inner rounded angle, rising to 1,450 pounds per square inch as compared with 1,150 lbs. per square inch at the corresponding point on the outer contour. The stress along the upper and lower boundaries of these openings is mainly tensional, as the curve of distribution indicates, and is very uniform near the centre with a maximum value of 385 pounds per square inch.

CORNICES.

Many interesting examples of stress distribution arise in cases where for either purely architectural reasons, or for strictly utilitarian purposes, masonry is undercut so that only a part of the full width of one face of two blocks in contact bears on the next block. In such a case a comparatively great intensity of stress is developed at point A, Fig. 23, and at the corresponding internal angle immediately above, while the distribution of pressure is in general non-uniform over the whole plane $A\ B$.

It has already been shown* that when two unequal rectangular blocks of the same material are pressed together this latter effect may in general be expected, and that so far as experiments have been made uniform stress is only obtained when the two plane faces in contact are similar and equal and of the same material with loads on the end faces applied uniformly. We may, therefore, expect that if one block projects beyond the other non-uniform stress will, in general, also be found over the contact surfaces even if every care is taken to apply the load uniformly over the end faces.

Examples of this kind occur frequently in many structures. An important case is found in cornices of buildings and other structures, and this has been examined for one particular type of a cornice of the "Wren" type by Miss Janet Harris, a research student of the Engineering Department.

The isoclinic lines found here, Fig. 24, when load is applied very evenly above the cornice leave no doubt as to the non-uniform distribution of the stress at both faces, and this is confirmed by the lines of principal stress shown in Fig. 25. The colour effects observed also show that there is great stress at the ends of the face, and more especially at the end where the cornice projects.

A detailed examination of the stress distribution of the upper face $A\ B$, with a mean average stress of 1,600 pounds per square inch due to an applied load of 200 pounds, proves that an intensity of 2,710 pounds per square inch is developed at A, which falls very rapidly to 1,030 pounds per square inch and then gradually rises to 2,060 pounds per square inch at the outermost point B. Moreover, the stress distribution p is not normal and cross stress is developed which gives a tangential stress of $p \sin^2 \theta + q \cos^2 \theta$ along the joint, and may be of considerable magnitude, as q itself rises to a maximum value of 383 pounds per square inch. As a check on the accuracy of the work the total normal stress

$$\Sigma\, p_n = \Sigma\, (p \cos^2 \theta + q \sin^2 \theta)$$

shows that 194 pounds of load is accounted for by the measurements, or an error in defect of 3 per cent., Fig. 26, some part of which may possibly be accounted for by friction in the bearings of the compression machine used and slight errors in its calibration.

Similar results are obtained on the lower face which was examined independently, and the results are also recorded in Fig. 25.

The stress distributions over the upper and lower faces, while very unsymmetrical, have a near resemblance to each other and account for the load upon them. They are, in fact, such as might be expected with a cornice of a purely symmetrical type with respect to the midway horizontal plane of the stone, and we are led to infer from these results that widely different types of cornice may be expected to give somewhat similar non-uniform stress distribution over the plane faces in contact, although this conclusion requires the confirmation of further experiments on several other types.

It may seem surprising that the effect of a mere side projection should exert so great an influence on the stress distribution at the joints, especially as it is known from earlier experiments that equal rectangular blocks pressed together by uniformly applied forces on the end faces give uniform compression stress across the faces. It must, however, be borne in mind that in the latter case the strains in the direction of the load are necessarily all equal at every point, whereas in the case of a cornice the projecting part, although free from direct load, is subjected to the action of stress over two plane faces which compress the part built into the wall, and in doing this a variable strain is imposed on the free part, which is naturally most intense at the junction with the wall, but is not inconsiderable at some distance away from the face.

Stress is, therefore, produced in the projecting part of the cornice itself, as may be confirmed in a dark field of view by the application of load, which has the immediate effect of causing colour bands to appear there. The directions of this stress system are shown in Fig. 25, and this latter diagram also indicates that it is only the very outermost part of the cornice which is practically free from stress.

The resistance to deformation exerted by the projecting part of the cornice has, therefore, the effect of producing great concentration of stress at its junction with the wall and of modifying the distribution over the face in a manner which depends on the width of the joint. Proceeding inwardly along the joint the stress falls very rapidly and attains a minimum value and then steadily rises to another maximum value at the inner face.

This stress concentration at the ends of the joints, and particularly at the face of a wall may, in unfavourable circumstances, become dangerous and lead to the cornice itself being pinched off in places where, owing to unequal settlement of the foundations of a building or other causes, undue load is thrown on some part of a wall. Opening out the joints at the cornice has the effect of

* "Contact Pressures and Stresses," by Prof. E. G. Coker, K. C. Chakko and M. S. Ahmed, Min. Proc. Inst. of Mechanical Engineers, 1921.

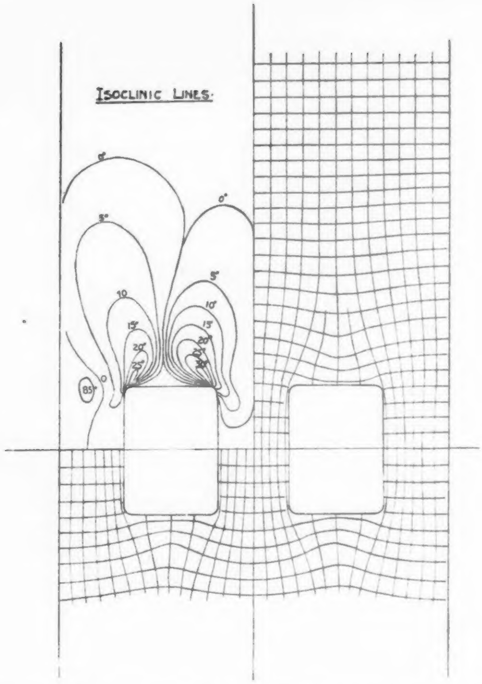


FIG. 21.—ISOCLINICS AND LINES OF PRINCIPAL STRESS IN A WALL OF LIMITED WIDTH WITH TWO RECTANGULAR OPENINGS

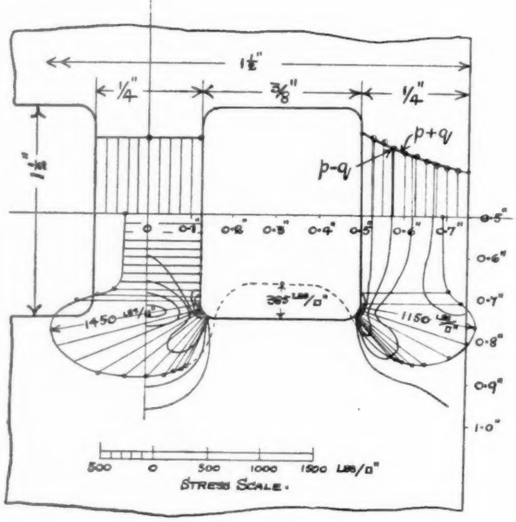


FIG. 22.—STRESS DISTRIBUTION IN A WALL OF LIMITED WIDTH WITH TWO RECTANGULAR OPENINGS

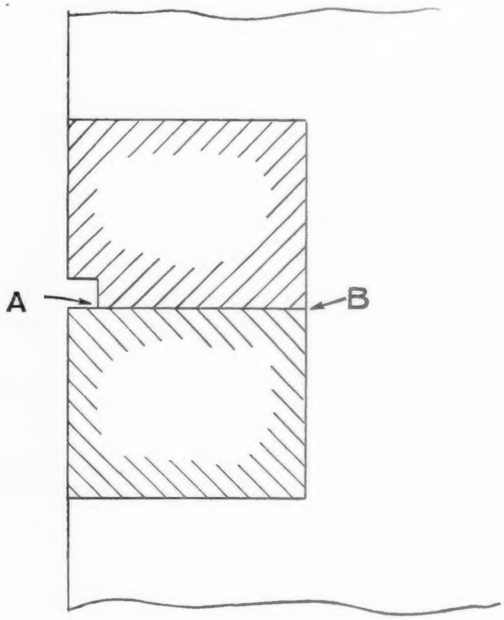


FIG. 23

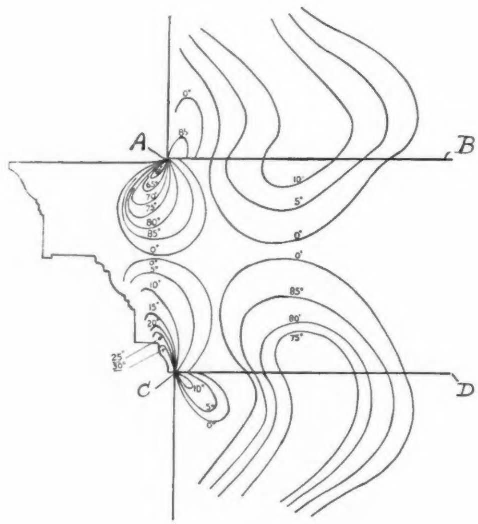


FIG. 24.—ISOCLINES "WREN" CORNICE

transferring the maximum concentration of stress to the points where the joint is carried back, and increases the stress concentration there owing to the diminished contact area, and also possibly to the increased eccentricity of the load above. Vertical slits carried a short distance into the cornice at the wall face diminish the concentrations at the ends of the horizontal joints, but introduce new ones at the ends of the slits of not much less intensity even when the ends of the slits are well rounded. From a structural point of view these observations show, in fact, that the primary defect of a cornice is that it

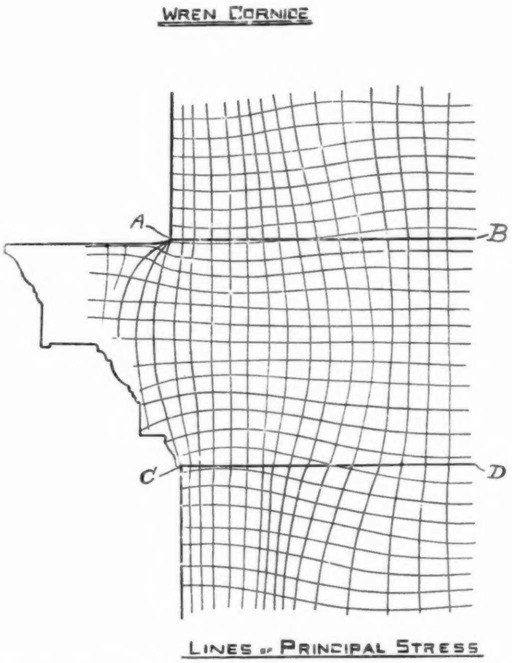


FIG. 25.—LINES OF PRINCIPAL STRESS, "WREN" CORNICE

is an addition of material in such a manner as to cause increased stress which would not otherwise develop. An appreciable reduction of stress may be obtained if the cornice is part of a block of greater depth than itself, and some preliminary measurements show that this gives some improvement in the stress concentration.

These illustrative examples are probably sufficient to give an idea of a form of investigation on the stress distributions in buildings, which is capable of great extension, since there are any number of still more complicated problems other than the types selected which could be solved, and which would probably repay examination.

It may, therefore, be of interest to outline the possibilities of further work in this direction. No attempt has been made here to reproduce the features of the construction of building made by assembling bricks or masonry blocks bonded together in various familiar ways, but it would not be difficult to construct models in which such units are cemented together, and since there is a considerable range of transparent bodies available it is also possible to build up composite structures to represent the use of materials like brick, stone, cement and steel in combination.

In particular, the question of stress distribution in reinforced concrete structures offers a very promising

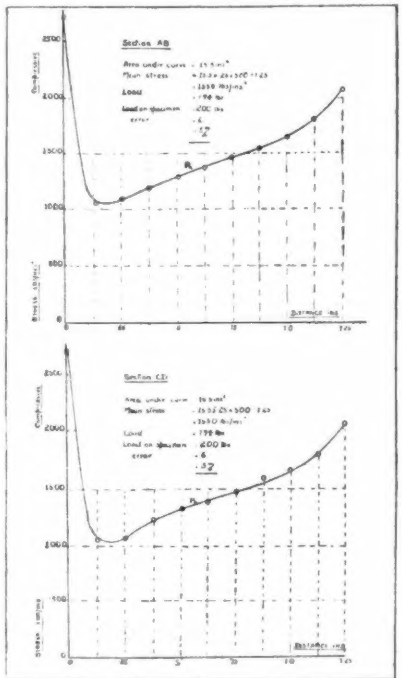


FIG. 26.—NORMAL STRESS DISTRIBUTION ON UPPER AND LOWER FACES OF "WREN" CORNICE

field of work, as experiments show on the union of transparent materials with thin rods of organic substances of superior elasticity or of metal wires.

In another direction it is found that the shaping of sections used in steel frame-works, and the riveting of these together, is quite a feasible operation and has, in fact, been accomplished for a roof now shown.

We may therefore hope that further investigation of this kind on models of buildings may afford some help to architects in providing economical structures suitable for modern necessities.

In conclusion, I wish to express my warmest thanks to my research assistants, Miss Janet Harris, B.Sc. and Mr. R. Miyasima, who have made nearly all the detailed observations described in this paper.

[*The discussion on Professor Coker's Paper will be published in the next issue of the Journal on* 20 *February*.]

Westminster Abbey Re-examined*

BY ERNEST A. R. RAHBULA [*A.*].

Few men can write on the subject of the Abbey with the authority and intimate knowledge possessed by Professor Lethaby. The new book bearing his name will therefore be welcomed by all lovers of the building, but to some it may come as a slight disappointment, when they open the volume, to find that they are already acquainted with several of the chapters which appeared as a series of articles in *The Builder* during the year 1924.

The author, however, was well advised in republishing these in the present work, which is a valuable addition to the literature on Westminster and a worthy companion to his former volume, *The King's Craftsmen.*

The new book is not, as the title may imply, a revision of the previous work, though, where in the light of fresh evidence or more considered judgment the author modifies his original opinions, he now gives us the benefit of his conclusions.

To quote from the Preface, the present volume " is a supplement to, rather than a reprint of, the former book. . . . The special subject of this, as of the earlier study, is the form and details of the Abbey Church and other buildings as first wrought and the craftsmen who worked at them. The older volume remains a fuller study of the Royal Masons and other artists, while this is a complete study of the Buildings."

The first two chapters are devoted to a discussion on the Confessor's Church and the early Norman work. Of the former, by an able analysis and co-ordination of all the available evidence, we have what is perhaps the most convincing description yet given, and it may now be accepted as established that the Presbytery was only two bays in length with an apsidal east end and was flanked by side chapels. A greater element of conjecture enters into the reconstruction of the crossing and the western limb of the church, but here the suggestion that the word *vestibulum*, in the 11th century description of the Abbey, might be interpreted as " nave," and not in its modern meaning, is probably correct.†

Considering the importance of Westminster and the relative size of the infirmary halls in other Benedictine houses, it is difficult to believe that a small building of less size than St. Katherine's Chapel would have satisfied the Abbey in the twelfth century, as is now suggested.

Insufficient evidence has prevented any definite theory being advanced on the problems in connection with the thirteenth century Lady Chapel, but on the Chapel of Henry VII (for which it was demolished) we have two chapters in which it is well demonstrated how both the structure and its fittings were originally designed to emphasise the general character and purpose of this royal mausoleum.

Regarding the great rebuilding of Henry III, the record of the feverish haste with which the work was pushed forward in 1252 and the possibility of a strike of the workmen the next year, followed by a period of comparative inactivity due to troubled times, shows that the architects of those days were confronted with much the same trials which harass their successors of to-day. In discussing the influence of contemporary French architecture on this work, the Cathedral of Amiens is now substituted for Rheims as having been the greater of the two main sources of inspiration, and numerous instances of similarity between Amiens and the Abbey, not only in parts of the plan but in the details, positions and *motifs* of various carvings, are adduced to support this conclusion. It is reassuring to national pride to have the author's conviction, added to those of other authorities, that Master Henry of Reyns, the architect for Henry III's first work, was an Englishman, a theory challenged by the late Mr. Westlake in his recent great work, but the matter is purely of academic interest, and, until the birthplace and parentage of Master Henry are discovered, is quite beyond positive proof.

In the chapter on the Chapter House we have an original, and what must be a correct, reading of the larger part of the much-worn inscription on the beautiful tile floor. The work of past " restorers " generally has been considerately dealt with, and here Scott's mistake in failing to appreciate that the quatrefoil in the tympanum of the Annunciation doorway should have been left open is well argued, as are, in other parts of the book, the debatable points in connection with the original design of the north front of the North Transept.

It is impossible to make even a passing reference to the number of subjects discussed, all in the same scholarly and sympathetic manner, which brings vividly before the reader the glory of the Abbey as it was in the Middle Ages. Sculpture, glazing, mosaic-work and painting, metal work and tombs, all have their place, and we meet again with pleasure the craftsmen who fashioned them.

Accustomed as we are to seeing the Abbey in the sombre atmosphere of to-day, it takes an effort of the imagination to visualise the church as it looked

* *Westminster Abbey Re-examined.* By W. R. Lethaby. Duckworth, London. 1925. 21s. net.

† Since writing the above Mr. A. W. Clapham, F.S.A., tells me that in the early account of St. Ricquier Picardy, quoted by M. Durand in his monograph on the building, the word *vestibulum* is used in a sense that the author proves conclusively to have been the nave of the church.

"in its first freshness—sharp, unencumbered, light and undirted." And it will come as a shock to many to be reminded of its former gayness. Few and small as the remnants are, enough evidence, however, has been found to show that not only were the walls and vaulting richly decorated with colour, but the sculpture and tombs added to this cheerfulness; "even the little knight in the gable of Crouchback's tomb," we read, "had red cheeks and he rode a dappled horse."

The reader will disagree with few of the conclusions arrived at on the debatable problems raised, but in dating the Roman coffin (now in the Museum) from the character of its lettering as being not later than A.D. 200, the author has omitted to reconcile the lettering with the inscription itself, which, the late Mr. J. S. Joyce pointed out, could not be earlier than the latter part of the fourth century.

The book is well produced and the type is good, but the lack of an index is felt; an obvious printer's error on page 22 unfortunately post-dates the Norman work at Winchester Cathedral by 100 years.

Only three photographs have been included amongst the numerous drawings and sketches which illustrate the volume; most of the latter have been made by the author.

To the mixed feelings of delight or depression which follow, as one realises the wealth of what is left or contemplates the destruction of the past, must be added a sense of gratitude and relief that the buildings are now in the care of such sympathetic and conservative hands. "The systematic cleaning of the structure and monuments," writes the author at the end of one chapter, "has given me more pleasure during my little term than almost anything else—the one greater pleasure is the new work I have *not* done in the ancient church."

Would that past guardians of the Abbey, and many of those under whose care lie other of our famous buildings, could express such pious pleasure!

Correspondence

LINCOLN CATHEDRAL.

12 *Stratford Place, W.*
18 *January* 1926.

The Editor, JOURNAL R.I.B.A.,—

DEAR SIR,—We are greatly indebted to Sir Charles Nicholson and to Sir Francis Fox for their most interesting papers upon the history of the building of Lincoln Cathedral and the story of its failures and repairs. Time prevented any discussion of technical detail at the meeting and I should therefore like to offer the following observations.

A chronological record of defects and of works of reparation is of great value as indicating what methods of repair are most durable.

Any large operation of grouting, however, does not appear in these records at Lincoln. Having regard to the nature of the defects, I should like to suggest a fuller consideration of the important question of shrinkage in this liquid mortar and to offer a word of warning.

Mr. Godfrey, the clerk of works, informed us that no expansion or shrinkage had been discovered in grout which had been cut out after a comparatively short test.

Having regard to the composition of the grout and its method of application, this statement conflicts with ordinary experience.

The cause of most of the trouble at Lincoln, as indeed in the majority of similar cases, is shrinkage of the core from the ashlar facing. The core and facing of the walls are unequal in their relative proportions of mortar and therefore of moisture. Judging by photographs, the aggregate of the core at Lincoln is large and uneven; therefore, the quantity of mortar must be excessive in proportion to aggregate—probably as much as 30 per cent. to 40 per cent.

A slow setting concrete of this kind is unreliable; it cannot, without structural precaution, set equally, or combine with the ashlar facing.

Its first tendency is to expand in the process of setting which, under unfavourable circumstances, will slightly bulge the facing.

The great amount of water used in the rubble and deposited as rain during building must in evaporating have involved a loss of bulk in the body of the wall.

This loss of mass is represented by the natural shrinkage of the core and the inevitable cleavage from the jointed stone skin, the mortar of which shrinks but slightly.

The grout, which is now being inserted in great quantities, is applied, as indeed the rubble was built, from the bottom upwards, and is stated to have great penetration.

It contains a very large proportion of water to cement and greater still to sand. The preparation of the walls is mainly one of complete saturation, so that there is an appreciable increase in the body of the old lime rubble, partly created by the re-energising of the lime.

The samples of grout which were exhibited at the meeting showed a very low proportion of sand to cement. This proportion requires a large amount of water for its effective working and application. Large cracks are being filled up with solid grout after a thorough preliminary saturation. The result of it all is that apart from the added weight a vast quantity of cement grout has been applied to crevices in a defective lime core, and, independently of other tendencies, must shrink in evaporating.

It is impossible to say to what extent fissures will take place, but when it is also understood that the penetration of grout is uncertain and unequal, it does seem desirable that opportunities should be seized of rebuilding the core or parts of it when they occur.

Alternatively a system of building in of brick or tile ties and grouting the intervening spaces would be more permanent in its effect than the indiscriminate grouting, with unnecessarily powerful material, walls of uncertain structural condition.

It is satisfactory to know that metal used in works of reinforcement at Lincoln are of non-corroding kind.—Yours faithfully,

W. A. FORSYTH [*F.*].

MODERN TENDENCIES IN FRENCH ARCHITECTURE.

Atelier Auguste Perrett,
93 *Avenue de la Grande-Armée,*
Palais de Bois,
30 *December* 1925.

The Editor, JOURNAL, R.I.B.A.,—

DEAR SIR,—There is a statement by Col. H. P. Cart de Lafontaine in the issue of the R.I.B.A. JOURNAL for December 5 which I fear may be misleading to most readers. The statement is " *that this new orientation of architectural conception and composition has its roots in this very school* " (*i.e., French National School*), and is the second paragraph, first page.

The fact of the matter is that the very reverse is true, and I can only assume that your author has been misinformed.

The members of this Atelier, who read the JOURNAL, resent the above statement and have asked me to do what I can to correct it.—Yours truly,

S. WOODS HILL [*A*.].

6, *Gray's Inn Place,*
*Gray's Inn, London, W.C.*1,
18 *January* 1926.

The Editor, JOURNAL, R.I.B.A.,—

SIR,—I have just received Mr. S. Woods Hill's letter of December 30, 1925, and in reply to the opinion expressed therein would like to draw your correspondent's attention to the context which gives, I think, an accurate appreciation of the situation as regards architectural tendencies in France at the present time. The paragraph in my article which immediately follows that quoted by Mr. S. Woods Hill reads as follows :—" And those who took part in the recent International Congress on Architectural Education will remember that the French delegates drew attention to the two strong currents of architectural thought which exist in France at the present time, commenting on the way in which new constructional possibilities are gradually transforming preconceived standards of proportion and beauty. . ."

It may be of sufficient interest to your readers to quote from the papers read at the Congress by Monsieur A. Defrasse, himself a " Chef d'Atelier," and member of the Council of the " Ecole des Beaux Arts " and Monsieur Léon Jaussely, Professor at the French National School.

Monsieur Defrasse, in his paper on " Architectural Education in the Present " (pp. 43-45), says :—" I have now reached the second part of my survey, that in which I shall endeavour to set out the result of the training given at the ' Ecole Nationale Supérieure des Beaux Arts.' This part certainly is the most interesting, but it is also difficult, because a sincere and attentive observer must note that a spirit of unrest prevails, a period of crisis in the teaching of architecture is manifest. Professors and students alike are uncertain of their solutions, uneasy as to the direction in which their researches should be made, as doubtful as to intellectual tendencies in the matter of architectural composition and design. . . . Two currents of opinion, very distinctly divergent, exist in educated minds : some think that the rules of harmony are immutable, and that the beautiful proportions which we have inherited from the classic period and which were renewed with the Renaissance, the portion of parts and forms, are already established and that the artist should find the expression of his personality within the framework defined by a healthy traditional style, the sure guide to good taste. Others consider that the use of new materials should modify the ancient forms and proportions, that the precursory signs of an architectural revival, of a new style, as they say, are showing themselves and they revolt against the notions resulting from tradition ; no more scholarly forms for them, form should simply result from calculations and scientific facts." Monsieur Defrasse then examines the problem in some detail and remarks (of the advanced students of the Ecole des Beaux Arts) : " All are moulded by healthy tradition, are able to design and move with freedom in the domain of construction. *Some have resolutely attacked the new problems ; and, guided by their professors, they have become the indispensable artizans who will know how to combine the sobriety of truly modern lines with something of the greatness and beauty of the classic past.*"

The italics are mine.

Monsieur Jaussely, in his paper on " Architectural Education of the Future " (pp. 62–63), indeed goes further than this and says :—" Whatever opinion we may hold of the present evolution of architecture, it is undeniable that this evolution does exist and that we are at present witnessing conscious or unconscious attempts to renew architectural forms and æsthetics.

" This revival is more particularly noticeable in important buildings, large stores and bridges, churches, banks, cinemas, railway stations, airship sheds, etc., which we can consider are the expression of the monumental architecture of our time, and which logically should be compared with that of other epochs in order to understand the meaning of this architectural transformation." After examining the problem of the " new æsthetics," Professor Jaussely says :—" Does this new orientation demand a new teaching of architecture ? It seems that it must be so."

One could continue at some length, but I hope that these opinions of our distinguished colleagues who have spent the greater part of their lives in the study of the question will be sufficient to convince your correspondent that it is not inaccurate to say " that this new orientation of architectural conception and composition has its roots in this very school (the Ecole des Beaux Arts)."

I should like to thank Mr. S. Woods Hill for having raised this point and would suggest that the apparent divergence of our views may be explained by the fact that it is extremely difficult to appreciate general tendencies unless one has a sufficiently detached position as there is always a danger of " not seeing the wood for the trees."—I am, yours faithfully,

H. P. L. CART DE LAFONTAINE [*A*.].

THE CONDITION OF THE BUILDING INDUSTRY—AND INCREASED COST OF BUILDING WORK,

The Broadway,
Totland Bay, I.W.
20 *January* 1926.

The Editor, JOURNAL, R.I.B.A.,—

DEAR SIR,—In the report of the Paper read by Mr. Welch on " The Condition of the Building Industry," and the discussion, there is a point that strikes one very forcibly,

and that is the apparent impossibility of obtaining anything like reliable statistics of output in the building trades.

Taking the case of the bricklayers ; the figures given by Mr. Welch differ so completely from those given by Mr. George Hicks as to make it very difficult to form any opinion in the matter. According to Mr. Welch's figures there were 11,750 fewer bricklayers in 1924 than in 1913, and also from statistics and particulars given him by various builders a rod of brickwork takes 14 hours longer to lay than in 1913. Yet according to Mr. George Hicks two thousand million more bricks were laid in 1924 than in 1913, with 25,000 less bricklayers. The difference in these figures is so great that it makes one realise that there must be great miscalculation somewhere.

Perhaps when the joint committee of architects, builders, and operatives, proposed in the Paper, and so very desirable for the well being of the industry as a whole, is formed, it will be possible for the various parties to lay their figures and the sources from which they are obtained on a committee table, and thoroughly thrash out these impossible differences. It is only by these means, I think, that we can find out what is wrong, and endeavour, by the joint goodwill of all the parties concerned, to put our house in order and improve the noblest industry in the world.—Yours truly, W. A. COLE ADAMS [*A*.].

THE ARCHITECT AND HIS WORK.

Prudential Chambers,
Banbury.
26 *January* 1926.

The Editor, JOURNAL, R.I.B.A.,—

DEAR SIR,—Allow me to offer my humble congratulations to the authors of ***The Architect and His Work.*** It will undoubtedly be very useful to young architects in practice, particularly those in the country. The brevity and businesslike composition are its asset.—Yours faithfully, F. J. COOKE [*L*.].

Allied Societies

BRISTOL SOCIETY OF ARCHITECTS.

PROFESSOR ABERCROMBIE'S ADDRESS.

"CITY IMPROVEMENTS AND REGIONAL PLANNING."

Professor P. Abercrombie, F.R.I.B.A., gave an address on "City Improvement and Regional Planning" at a meeting of the Bristol Society of Architects on 21 January. Amongst those present was Sir John Swaish (Chairman of the Bristol Town Planning Committee).

Mr. R. C. James, F.R.I.B.A. (President), who was in the chair, said the Society considered the subject was likely to interest not only architects but the general public, more especially, perhaps, landowners, and they had therefore decided to throw the meeting open to the public, and he was pleased to welcome such a large audience.

Professor Abercrombie said that some might think the title of his address should be a subject for two addresses, but his object was to try to join up the two ideas of city improvement and regional planning, and to show that they had an intimate and real connection. The tendency in regional schemes was often to concentrate on areas between towns rather than on towns in relation to surrounding areas. There was an unreality in preparing elaborate schemes for towns without legislative means of execution, but he was emboldened to speak of city improvement from the fact that the present Minister of Health, Mr. Neville Chamberlain, was shortly to introduce much more extended powers for dealing with cities as they are. He thought there was a clear case for every town to prepare a scheme for central improvement as well as joining with near-by local authorities for preparing regional plans. All would agree that they were up against great difficulties in preparing large schemes of central improvement, such as questions of cost, compensation for property, and matters of that kind. His contention was that when they were dealing with a region such as that, for instance, in which Bath and Bristol were the two focal points, it was essential that they should think of the future of the two cities and other towns in the region in connection with the development of the countryside around. That evening he would ask them to divest themselves for a moment of any consideration of existing boundaries of authorities, for boundaries could be changed where necessary, and to think of areas on their own merits, from a three-fold point of view :—(1) Of place ; (2) of work ; and (3) of people. In regard to the first there were points of topography and geology to be considered. In the past there had been a tendency to ignore those and to build houses where they were most wanted on the spur of the moment. As to the second point, work, they had to consider what were the mainsprings of a town's prosperity. In some there was the residential or health consideration, such as in the case of Bath and Weston-super-Mare. At Chester, for instance, there was a variety of considerations, some of which were in opposition to one another, and it was of importance to think what should be worked for, and whether any one element should be suppressed or developed. In Bristol they had an interesting problem in the new docks being further down the river. Did that mean that the industrial element was going to change ? Were the factory areas to go up the Avon towards Bath or go down the Avon in the direction of Avonmouth ? What was the best use to which the valley between Bristol and Bath should be put ? Should it be industrialised or kept in its beauty for recreational purposes ? Then, again, what areas should be given up totally to factories, or did they intend to keep a mixture of factories and houses in certain parts ? In the past, nearness to work had been the chief consideration governing the position of houses, and in Lancashire they found large mills with groups of houses around them. Since the War a most drastic revolution had come in the means of locomotion, and he thought the motor-'bus was more revolutionary than the locomotive. The tendency, he thought, would be for the population to spread more over the countryside. As the towns were improved, and the centres of towns became cleared, there would be a tendency for even the poorer people to get away, and that would mean a new grouping of the population. When large masses of people moved the question was not merely one of moving out to new suburbs but of moving further afield and forming new dormitory towns. That was a point to be borne in mind in regional planning. What should be guarded against was "ribbon" development—a stretching out along the sides of new roads. That was not only ugly, but uneconomical, and a scattered population was difficult to deal with in regard to drainage, lighting and other matters. A better method was to take certain centres and develop new towns or villages, and that would require much study in regional planning. Road planning would follow on such fundamental requirements. Road planning should not dictate where people should live but be ancillary to it. The question of open spaces must be borne in mind, and should not be considered simply from the point of view of a single local authority, and he did not see why certain

local authorities should not combine to provide suitable regional open spaces. Finally, it should be seen that suitable civic centres were provided with room for development. Professor Abercrombie alluded, in conclusion, to the fact that in the Bristol and Bath district those concerned were working in close co-operation with regard to future development, much closer than in any district with which he was familiar.

A cordial vote of thanks was passed to Professor Abercrombie on the proposition of Mr. G. C. Lawrence, F.R.I.B.A., seconded by Mr. L. S. MacKenzie, the City Engineer.

NORTHERN ARCHITECTURAL ASSOCIATION.

Annual Dinner.

The annual dinner of the Northern Architectural Association was held on the 30 January. The chair was occupied by Lieut.-Col. G. Reavell, O.B.E., President of the Association, who, in proposing the toast of "Our Municipal Corporations," said a great problem was presented to their governing body in dealing with the large mass of traffic which would be created by the new bridge. They had considered that problem soundly and well, and they had eventually decided on the scheme which, by public vote, had been defeated that day. He wished that every voting paper had been headed: "Opportunities missed are seldom recalled." He could only hope that Newcastle would one day rise to its opportunities. The new street would have been a permanent asset to Newcastle.

Councillor W. Vincent Longfield (Deputy Lord Mayor) said they had spent months of strenuous work on schemes that had been turned down. While he did not feel crushed, he felt sympathy for those who did not feel as he did. He said, with the greatest respect, that in each of the particular schemes they would have to pay. He feared that cutting out the new street would submit them to a penalty of at least £50,000 a year.

The toast of "The Royal Institute of British Architects and Allied Societies" was proposed by Major Robert Temperley, M.A., O.B.E., D.L. (Chairman of Council, Newcastle Society), who expressed his pleasure that great educational bodies were prepared to co-operate in endeavouring to find the best way not only of producing good architects but also of educating public opinion in architecture.

Major Dosser (President, York and East Yorkshire Society of Architects), replying, said that co-operation between the allied societies was valuable in the direction of unity of practice and professional conduct.

Mr. Ian MacAlister, M.A. (Secretary R.I.B.A.), said they would undoubtedly be disappointed with regard to the day's news, but he was convinced that a great city like Newcastle was not going to sit down for ever under what had happened.

DEVON AND EXETER ARCHITECTURAL SOCIETY.

Formation of Design Club at Exeter.

A meeting to inaugurate an Architectural Design Club for Exeter and district was recently held at the University College, Exeter.

The chair was taken by Mr. E. F. Hooper, in the unavoidable absence of the President of the Society, Mr. J. Leighton Fouracre, and in addition to a large attendance of architects and students there were also present the chairman and secretary of the Exeter City Education Committeee, Alderman John Stocker, and Mr. A. C. Badcoe, and the Registrar of Exeter University College, Mr. A. K. Woodbridge.

After formal business, the Chairman explained the serious need of facilities for architectural education in Exeter and district, and that, following the remarks in the President's address on this matter, at the annual meeting held in March last, a small committee was formed to suggest lines on which suitable action might be taken. With the approval of the Council of the Society, the Architectural Association were approached. They suggested that subjects should be set in accordance with the A.A. School programmes, and offered the assistance of their masters, who would visit Exeter periodically to advise students and criticise their work.

Mr. F. R. Yerbury conveyed the good wishes of his Council, and said they were very willing to give every assistance in the formation of the Club.

Mr. Howard Robertson then addressed the meeting, and described in detail the scheme of training practised in the Architectural Association schools, explaining how this could be adapted to the requirements of the Exeter students. A collection of students' drawings which he had brought were used by him to illustrate the progress of a student passing through the various years of the school study.

The scheme for the working arrangements of the Club was briefly outlined by Mr. W. J. M. Thomasson.

Mr. Percy Morris proposed a vote of thanks to Mr. Yerbury and Mr. Robertson for their assistance both in preparing the initial details of the scheme and coming to Exeter to give the Club such an enthusiastic start.

LEICESTER AND LEICESTERSHIRE SOCIETY OF ARCHITECTS.

Annual Dinner.

The annual dinner of the Leicester and Leicestershire Society of Architects was held on Friday, 15 January, about 40 Members and guests being present. The President (Mr. E. T. Allcock, F.R.I.B.A.) was in the chair.

The guests included the Mayor of Leicester (Alderman Banton), Mr. H. Alderman Dickman (President of the Notts and Derby Society of Architects), Mr. John Platt (Principal of the Leicester College of Art), and Messrs. C. Stretton, F.R.I.B.A., and F. B. Cooper, A.R.I.B.A. The toasts included the King, Leicester City and Trade, and the Society.

Mr. J. Stockdale Harrison, F.R.I.B.A. (ex-President) made presentations on behalf of the Society to Messrs. C. Stretton (late Hon. Secretary) and F. B. Cooper (late Hon. Treasurer) after 15 and 10 years' service respectively.

PRESENTATION TO MR. GOTCH

A replica of the portrait of Mr. J. Alfred Gotch, painted by Mr. T. C. Gotch, which now hangs in the Institute Galleries, has been presented to him by his fellow townsmen of Kettering. Mr. Gotch, in his turn, presented it to his native town at a large and representative gathering held on 20 January. Mr. Arthur Keen, in the unavoidable absence of Mr. Dawber, represented the R.I.B.A. at the gathering. The portrait will now form a permanent addition to the collection of the Kettering Art Gallery.

R.I.B.A. PAMPHLET ON "THE ARCHITECT AND HIS WORK.

This pamphlet, which was compiled by the Practice Standing Committee with the assistance of the late Mr. Paul Waterhouse, Past President, has been issued by the Council with a view to bringing before the general public the functions of an architect and his use to the community.

Members can obtain copies of the pamphlet for circulation to their friends, on application to the Secretary R.I.B.A. at a cost of 2s. 6d. per dozen.

Obituary

FRANCIS BAKER [*F.*].

The death has recently occurred in Canada of Francis Baker, who was a Past President of the Royal Architectural Institute of Canada, and for many years Hon. Secretary for Canada of the R.I.B.A. Mr. Baker occupied a prominent position as an architect in Toronto. He studied architecture in New York and afterwards in London in the office of the late Mr. Thomas Collcutt.

Mr. Baker was the first Canadian to be made a fellow of the Royal Institute of British Architects. Returning to Canada, he practised his profession in Toronto for upwards of thirty years. Some of the buildings he designed are the Saturday Night Building, the General Assurance Building, the Royal Bank Building, Yonge and Bloor Streets, and, in association with Carrère and Hastings, of New York, the Traders' Bank Building, Yonge and Colborne Streets. With George W. Gouinlock he designed the Temple Building, Bay and Richmond Streets, the Alexandra Palace University Avenue, and the Manufacturers' Building at the Exhibition.

Mr. Baker was in his 59th year.

JAMES FORBES [*F.*].

We regret to announce the death of Mr. James Forbes of Middlesbrough at the early age of 45 years. He served his articles with Messrs. R. Lofthouse & Sons, of the same town, who found him a brilliant pupil and an enthusiastic worker. On leaving them he went to London into the office of Mr. A. J. Wood and then into the office of the L.C.C., remaining in all about four years in London. He then returned to Middlesbrough, where he commenced practice on his own account in 1906. His abilities early produced for him a good general practice, which he maintained until his death. He was successful in competitions, and particularly in school work, winning the first premium for additions to the Linthorpe Schools, and the Marton Grove Secondary Schools, which are now being carried on at a cost of between £40,000 and £50,000. He also had an extensive practice in cinema work, designing and carrying out the new "Elite" Palace, Middlesbrough, at a cost of about £60,000, besides several smaller cinema theatres in the same district. He also carried out several medium-sized country houses in the district.

A.B.S. SCHEME OF INSURANCE.

The A.B.S. specialises in Life Assurance. In Whole Life Assurance the sum assured and bonus are payable at death and the payment of premiums normally continues throughout life. The bonuses which are usually payable with the sum assured may be surrendered for cash, applied to the reduction of future premiums or used to reduce the period over which premiums are payable. The Society is not tied to any insurance office and is prepared to offer and advise upon a wide choice of policies in leading companies. Half the initial commission is returned to the assured in the form of rebate and the other half forms a direct contribution to the Society's funds.

Please address all enquiries to the Secretary, Architects' Benevolent Society, 9 Conduit Street, W.1. Telephone: Mayfair 434.

THE AMALGAMATION OF THE R.I.B.A. AND THE SOCIETY OF ARCHITECTS.

The Society's Statement.

On 18 June 1925, the Society of Architects went into voluntary liquidation following its amalgamation with the Royal Institute of British Architects, prior to which the Society had made a donation of £525 to the Architects' Benevolent Society. After satisfying the Society's liabilities the liquidator has transferred to the R.I.B.A. property of the estimated value of £10,000. This includes the Society's leasehold premises in Bedford Square, £836 in cash, and invested funds amounting to £4,588, of which £3,263 is earmarked for developing and maintaining architectural scholarships including the late Society's Victory Scholarship of the value of £150.

The Institute will further benefit by the admission of some 1,400 new members transferred from the Society representing an increase in the Institute's revenue from subscriptions of over £4,000 per annum.

The Society of Architects was founded in 1884 and during the forty-one years of its existence has done much to promote the interests of architecture and architects particularly in the direction of Education and in advocating the Statutory Registration of Architects.

Under the amalgamation scheme the Institute is carrying on the Society's Educational and Registration work and has appointed Mr. C. McArthur Butler, who was Secretary of the Society for twenty-seven years, to be Secretary of the R.I.B.A. Registration Committee which has in hand the promotion of a Bill in Parliament for the Statutory Registration of Architects.

NOTES FROM THE MINUTES OF COUNCIL.

18 *January* 1926.

The Board of Architectural Education.

The following were appointed Corresponding Members of the Board :—

- Rodney H. Alsop, Victoria, Australia.
- Professor Claude Batley, School of Architecture, Bombay.
- Robert Cable, Bombay.
- Professor Percy Nobbs, McGill University, Montreal.
- E. M. Powers, Hon. Secretary R.I.B.A. for South Africa.
- S. Hurst Seager, New Zealand.
- B. M. Sullivan, Lahore, India.
- Sir John Sulman, Sydney, Australia.
- Professor Ramsay Traquair, McGill University, Montreal.
- Professor Leslie Wilkinson, University of Sydney, Australia.
- The President, Singapore Society of Architects.

Sir John Burnet, R.A., was appointed a member of the Board.

R.I.B.A. Prizes and Studentships.

The Award of the R.I.B.A. Prizes and Studentships for 1926 was approved and ordered to be submitted to the General Body.

BUILDING RESEARCH.

On the advice of the Science Standing Committee it was decided to invite the Institute of Builders to nominate three members to attend the February meeting of the Science Standing Committee to discuss the question of the possibilities of co-operation in building research work between the Institute of Builders and the Science Standing Committee.

THE BUILDING INDUSTRY.

On the advice of the Practice Standing Committee, the Council requested the Architects' and Builders' Consultation Board to take into immediate consideration as a matter of urgency the pending termination of the agreements regarding wages and hours in the building industry.

SPECIAL ELECTION TO THE FELLOWSHIP.

Under the provisions of the Supplemental Charter, 1925, Clause IV., the following architects were elected as Fellows of the R.I.B.A. :—

Mr. T. H. Lyon, Cambridge.
Mr. Henry Sproatt, Toronto.
Mr. E. R. Rolph, Toronto.

FINAL EXAMINATION.

On the advice of the Board of Architectural Education it was decided that students of Exempted Schools who are entitled to exemption from the Final Examination shall be required to come up for election as Associates within two years of the completion of their school course exempting them from the Final Examination, and that students who do not present themselves for election as Associates within these two years, except with the special permission of the Board, shall be required to take the R.I.B.A. Final Examination in the usual way if they wish to qualify for candidature as Associates.

DIPLOMAS OF ARCHITECTURAL SCHOOLS.

On the advice of the Board of Architectural Education it was decided that members holding the Diplomas of Recognised Schools shall be entitled to have the fact recorded against their names in the R.I.B.A. *Kalendar*.

STUDENTSHIPS.

The following were elected as Students of the R.I.B.A. :—

Alexander, Andrew Gordon, Y.M.C.A., Tottenham Court Road, W.C.
Bedingfield, Eric Edward, 1, Endsleigh Street, W.C.1.
Bolton, Joseph, Junr., Beaumont, Heaton, Bolton, Lancs.
Bright, George Edward, "Heathcote," Station Road, Westcliff-on-Sea, Essex.
Brinton, William Ralph, 20, Bigwood Court, Golders Green, N.W.11.
Brown, Cyril Clement, 15, Ashfield Terrace East, Newcastle-on-Tyne.
Cheesman, Kenneth, 151, Palmerston Road, N.22.
Clay, Ralph Henry, c.o. City Architect's Dept., Guildhall, Hull.
Cloke, Samuel Douglas Neighbour, 19, Whiteford Road, Mannamead, Plymouth.
Cooper, Reginald William Gase, "Wilstead," College Street, Long Eaton.
Edwards, Donald Thomas, St. Dunstans, Amersham Hill, High Wycombe.
Farmer, Geoffrey John, 1, Roland Houses, South Kensington, S.W.7.
Fry, Francis Stephen, 39, Walliscote Road, Weston-super-Mare.
Grigg, Leslie Arnold, 64 Queen's Road, Norwich, Norfolk.
Guy, Roderick Nelson, "Dalkeith," 128 Crescent Road, South Woodford, Essex.
Hamilton, John Visick, The Vicarage, Windsor.
Hobbs, Athol Joseph, 48 Lancaster Park, Hill Rise, Richmond.
Horner, Hugh Baldwynne, 31 Constantine Road, Hampstead, N.W.3.
Kemp, William Charles, 2A Portnall Road, Harrow Road, Paddington, W.9.
Millington, Cyril Richard, c.o. Maxwell House, 11 Arundel Street, Strand, W.C.2.
Morrison, James, 23 Upperkirkgate, Huntly, Aberdeenshire.
Mowbray, William Bawden, High Croft, Christchurch Park, Sutton, Surrey.
Neil, Charles Warren, "Langley," 14 Valkyrie Road, Westcliff-on-Sea.
Redding, Cyril Norman Meriden, Wormley, Broxbourne, Herts.
Rowles, Douglas Laurence, "Trondra," Beltinge, Herne Bay.
Scammell, Rodney Quinton, 706 Coventry Road, Small Heath, Birmingham.
Short, Harold, 53 Cowick Street, St. Thomas, Exeter.
Smith, William Wilfrid, 107 Buxton Road, Heaviley, Stockport.
Schultz, Israel, 1A Hunton Court, Hunton Street, E.1.
Thewlis, Edward Charles, "Canonsleigh," The Cliffs, Southend-on-Sea.
Tozer, Cecil Reginald, 4 Broadgates Road, S.W.18.
Unsworth, Herbert, 17 Gordon Avenue, Bolton, Lancs.
Varley, Herbert, "Bramleigh," Blacko, near Nelson, Lancs.
Wardle, Lionel Tallentyre, 9 Long Reach, West Horsley, Surrey.
Watt, John, Education Office, East Church Street, Buckie, Banffshire.
Wright, Gerald Ryby Hall, 7 Willow Grove, Beverley, East Yorkshire.

MEMBERSHIP.

The following applications for membership were approved :—

As Fellows, 10.
As Associates, 33.
As Hon. Associates, 1.

The following nominations for membership for election, 15 February, were approved :—

As Fellows, 20.
As Associates, 6.
As Hon. Fellow, Sir Frank Dicksee, P.R.A.
As Hon. Associate, Mr. F. L. M. Griggs, A.R.A.

Twelve Licentiates were elected under the provisions of Section III. (f) of the Supplemental Charter of 1925.

Five Subscribers were elected under the provisions of Section VI. of the Supplemental Charter of 1925.

REINSTATEMENT.

The following Members were reinstated :—
As Associate : E. L. Hampshire.
As Licentiate : T. Frank Hawkes.

RESIGNATIONS.

The resignations of the following members were accepted with regret :—

A. Macpherson [*F.*].
Robert W. Carden [*A.*].
T. L. Perkins [*A.*].
L. H. Bullock [*L.*].
R. S. Cowper [*L.*].
A. G. Hall [*L.*].
D. Lyle [*L.*].
James Neill [*L.*].
J. F. Lancaster [*L.*].

THE ARCHÆOLOGICAL JOINT COMMITTEE FOR ORGANISING THE CONTROL OF ANTIQUITIES IN THE NEAR AND MIDDLE EAST.

Mr. Ernest T. Richmond [*F.*] was invited to represent the R.I.B.A. on the Archæological Joint Committee for Organising the Control of Antiquities in the Near and Middle East.

IMPERIAL CONGRESS OF THE ROYAL SANITARY INSTITUTE, JULY, 1926.

Mr. H. D. Searles-Wood and Mr. J. Ernest Franck were appointed to represent the R.I.B.A. at the Imperial Congress of the Royal Sanitary Institute in July, 1926.

THE BRITISH ENGINEERING STANDARDS ASSOCIATION.

Mr. Harvey R. Sayer [*A.*] and Mr. Edwin Gunn [*A.*] were appointed to represent the R.I.B.A. on the following recently established Sub-committees of the B.E.S.A. Sectional Committee on Building Materials :—

1. Sub-Committee on a Standard Specification for Grey and White Hydrated Lime.

2. Sub-Committee on Standardisation and Simplification with regard to Slates and Tiles.

SOCIETY FOR THE PROMOTION OF HELLENIC STUDIES.

A contribution of £10 10s. was made to the funds of the Society for the Promotion of Hellenic Studies for the year 1925.

BOARD OF ARCHITECTURAL EDUCATION. THE R.I.B.A. (ANDERSON AND WEBB) SCHOLARSHIP AT CAMBRIDGE.

The Scholarship is offered by the Royal Institute of British Architects for the study of Architecture at Cambridge University by means of the three years' course in Architectural Studies, the successful completion of which carries with it the ordinary B.A. Degree of the University and exemption from the Intermediate Examination of the R.I.B.A.

The administration of the Scholarship is in the hands of the Board of Architectural Studies at Cambridge. It has an annual value of £70, is tenable for two years from October 1926, and is renewable for a third year if satisfactory progress has been made.

It is the intention of the donors that the Scholarship should be awarded to the most promising candidate from the Public or Secondary Schools or from any Training School in Art or Technology, whose financial circumstances would not otherwise permit him to enter the University and take the Degree in Architectural Studies. It is desirable that candidates should be in their 18th or 19th year.

Every candidate must comply with the following conditions :—

1. To have passed, or have been exempted from, the Previous Examination of the University, at latest in June 1926.

2. Submit an application, with testimonials, to the Secretary of the Board of Architectural Studies not later than 5 June 1926, containing :

(*a*) Full name, nationality, exact age and concise particulars of education up to the time of application.

(*b*) Specimens of drawings, freehand or geometrical, and not less than three or more than six in number. The drawings need not necessarily be architectural. They should be sent rolled or flat (not folded) and be packed carefully.

(*c*) An essay, legibly written in ink or typed, on any subject selected by the candidate.

(*d*) A letter of recommendation from the candidate's Director of Studies, confirming the *bona fides* of the work he submits, and giving evidence of his financial necessity. It is desirable that this letter should give some information on the mathematical abilities of the candidate.

A candidate may be required to appear personally before the Board of Architectural Studies in Cambridge or in London before the end of June 1926.

EDWARD BULLOUGH,
Secretary to the Board of Architectural Studies,
Gonville and Caius College, Cambridge.

R.I.B.A. MAINTENANCE SCHOLARSHIPS SCHEME.

The Board of Architectural Education have been informed that the Council of the Artists' General Benevolent Institution have decided to participate in the R.I.B.A. scheme and to grant a Maintenance Scholarship, provided the parent of the student is eligible for assistance from the Institution.

Mr. Edmund Wimperis, F.R.I.B.A., has been appointed to represent the Institution on the R.I.B.A. Maintenance Scholarships Committee, the first meeting of which will be held shortly.

In addition to those provided by the R.I.B.A. and the Artists' General Benevolent Institution, Scholarships have been given by the Society of Architects (now amalgamated with the R.I.B.A.) and by the proprietors of *The Builder*, while the Rev. Dr. and Mrs. Hugh Currie have decided to found, in due course, a Maintenance Scholarship in memory of their son.

R.I.B.A. VISITING BOARD.

The R.I.B.A. Visiting Board have had under consideration an application from the Central Technical College, Brisbane, for the recognition of its four years' part-time course as exempting from the R.I.B.A. Intermediate Examination.

The Visiting Board have nominated Professor Leslie Wilkinson as their representative to visit the Central Technical College, Brisbane, and to report upon the application for exemption.

Special meetings of the R.I.B.A. Visiting Board (excluding meetings connected with visits to Schools of Architecture) will be held at the R.I.B.A. on the following dates :—

24 June 1926.
21 October 1926.

Schools of Architecture wishing to bring any matters before the R.I.B.A. Visiting Board should communicate with the Secretary to the Board of Architectural Education not later than 1 June and 1 October 1926.

R.I.B.A. EXAMINATIONS.

The following are the dates for the forthcoming R.I.B.A. examinations :—

Intermediate Examination.—May 28, 29, 31, June 1 and 3, 1926. (Last day for receiving applications—23 April 1926.)

November 19, 20, 22, 23 and 25, 1926. (Last day for receiving applications—16 October 1926.)

Final and Special Examinations.—July 7, 8, 9, 10, 12, 13 and 15, 1926. (Last day for receiving applications—4 June 1926.)

December 1, 2, 3, 4, 6, 7 and 9, 1926. (Last day for receiving applications—30 October 1926.)

Examination for the R.I.B.A. Diploma in Town Planning.—June 30, July 1, 2 and 5, 1926. (Last day for receiving applications—1 March 1926.)

Statutory Examination.—October 20, 21 and 22, 1926. (Last day for receiving applications—2 October 1926.)

NATIONAL HEALTH INSURANCE.

The Architects' and Surveyors' Approved Society.
26 Buckingham Gate, London, S.W.1.

CONTRIBUTIONS.

The contribution for men is 10d. per week, and for women 9d. per week, 5d. of which is in each case payable by the employer.

ORDINARY BENEFITS.

SICKNESS BENEFIT.—Men, after 26 contributions have been paid, 9s. weekly ; after 104 contributions have been paid, 15s. weekly. Women, after 26 contributions have been paid, 7s. 6d. weekly ; after 104 contributions have been paid, 12s. weekly.

DISABLEMENT BENEFIT.—Men and women, 7s. 6d. per week, after 104 contributions have been paid.

MATERNITY BENEFIT.—40s. after 42 contributions have been paid.

ADDITIONAL BENEFITS.

SICKNESS BENEFIT.—Payable at the increased rates of 22s. per week for men, and 19s. for women.

DISABLEMENT BENEFIT.—Increased to 11s. per week for both men and women.

MATERNITY BENEFIT.—Increased to 54s.

SPECIAL BENEFITS.—Grants made to members entitled to " additional benefits " amounting to the full cost of any optical, dental, hospital or convalescent treatment, also for glasses, surgical appliances, artificial teeth, etc. Members may choose their own institutions, nursing homes or practitioners.

Further particulars and forms of application for membership may be obtained from the undersigned.

HERBERT M. ADAMSON, *Secretary.*

Notices

THE EIGHTH GENERAL MEETING.

The Eighth General Meeting (Business) of the Session 1925-26 will be held on Monday, 15 February 1926, at 8 p.m., for the following purposes :—

To read the Minutes of the General Meeting (Ordinary) held on 1 February 1926 ; formally to admit members attending for the first time since their election or transfer.

To proceed with the election of the candidates whose names were published in the JOURNAL for 23 January 1926 (page 197).

To announce the names of candidates nominated by the Council for election to the various classes of membership.

To announce the Council's nomination for the Royal Gold Medal, 1926.

Mr. Herbert W. Wills [*F.*] has given notice that he will move the following Resolutions :—

> That the Regulations for the conduct of architectural competitions be amended by the adoption of one of the two following changes (A) or (B) and the addition of Clause (C). Details to be left to the consideration of the Competitions Committee.
>
> (A) All binding conditions should be eliminated. Instructions to competitors to take the form of suggestions which both they and the assessor may follow as they deem fit.
>
> (B) That binding conditions be retained and that in case a competitor considers they have been ignored he shall have the right to appeal to the Competitions Committee of the Institute. In doing so he shall pay an agreed deposit to the R.I.B.A., such deposit being forfeited to the R.I.B.A. if his complaint is considered by the Competitions Committee to be unfounded. If, on the other hand, they find on investigation the complaint is justified they shall so report and the award shall be quashed, a new assessor appointed by the President who shall assess the whole of the designs sent in and to whom the assessor's fee agreed upon shall be paid.
>
> (C) Whenever architects are invited to send in applications and qualifications for selection for a limited competition, such invitation shall be advertised at least on three different dates during a period of not less than one month.

VISIT TO MESSRS. COURTAULD'S NEW PREMISES, ST. MARTIN'S-LE-GRAND.

A visit has been arranged by the Art Standing Committee to take place on Saturday afternoon, 20 February, to the above premises now approaching completion. Members desirous of taking part are requested to make early application to the Secretary R.I.B.A., 9, Conduit Street, London, W.1.

ELECTION OF MEMBERS, 7 JUNE 1926.

Associates who are eligible and desirous of transferring to the Fellowship class are reminded that if they wish to take advantage of the election to take place on 7 June 1926,

they should send the necessary nomination forms to the Secretary R.I.B.A. not later than 1 April 1926.

LICENTIATES AND THE FELLOWSHIP.

The attention of Licentiates is called to the provisions of Section IV, clause 4 (*b*) and (cii), of the Supplemental Charter of 1925. Licentiates who are eligible and desirous of transferring to the Fellowship can obtain full particulars on application to the Secretary R.I.B.A., stating the clause under which they propose to apply for nomination.

ROOMS FOR ARBITRATIONS, ETC.

Convenient rooms for arbitrations, etc., are now available for hire at No. 28 Bedford Square, W.C.1, at a fee of £2 2s. per day. All enquiries with regard to vacant dates, etc., should be addressed to Mr. C. McArthur Butler at that address.

DEGREES AND DIPLOMAS OF RECOGNISED SCHOOLS.

It is notified for the information of those concerned that Members or Students of the R.I.B.A. holding a Degree or Diploma in Architecture which carries with it the privilege of exemption, on the usual conditions, from the R.I.B.A. Final Examination, may now have that distinction indicated against their names in the R.I.B.A. *Kalendar*.

Persons who desire such distinction to be recorded in the next issue of the *Kalendar* should notify the Secretary R.I.B.A. as soon as possible.

EXHIBITION OF ARCHITECTS' WORKING DRAWINGS.

An Exhibition of Architects' Working Drawings will be held in the R.I.B.A. Galleries from Tuesday, 16th February, to Saturday, 27th February 1926.

The Exhibition will be open daily between the hours of 10 a.m. and 8 p.m. (Saturdays 5 p.m.) and will include drawings lent by—

Mr. Thomas Hastings and Professor C. H. Reilly (Devonshire House).

Messrs. Hennell and James (A house at Hampstead Garden Suburb).

Mr. L. Sylvester Sullivan (Building for Courtaulds, Ltd.).

The Exhibition is intended primarily for students of Architecture; they will be able to examine the drawings that a practising architect hands to a contractor, and thus will be afforded an insight into the methods adopted in a modern architect's office.

A Special Students' Evening will be held at the Exhibition on Tuesday, 23rd February, 1926, at 8 p.m. All students are cordially invited to attend. It is hoped that the architects who have lent the exhibits—or their representatives—will be present in order to explain the drawings to students. Refreshments will be provided and no cards of admission are required.

Competitions

BLACKPOOL MEMORIAL CLOCK TOWER.

The Corporation of Blackpool invite competitive designs for a Clock Tower with drinking fountain, to be erected in the new park. Assessor, Mr. E. Bertram Kirby, O.B.E. [*F.*] Designs to be sent in not later than Saturday, 13 February 1926. Conditions may be obtained from The Town Clerk, Town Hall, Blackpool, by depositing £1 1s., which will be returnable if a *bona fide* design has been submitted.

MANCHESTER TOWN HALL EXTENSION.

The President of the Royal Institute of British Architects has appointed Mr. T. R. Milburn, F.R.I.B.A., Mr. Robert Atkinson, F.R.I.B.A., and Mr. Ralph Knott, F.R.I.B.A., to act as a Jury of Assessors in connection with this competition.

PROPOSED NEW PARISH CHURCH, NEWBRIDGE, MONMOUTHSHIRE.

The Competitions Committee desire to call the attention of members to the fact that the conditions of the above competition are not in accordance with the regulations of the R.I.B.A. The Competitions Committee are in negotiation with the promoters in the hope of securing an amendment. In the meantime members are advised to take no part in the competition.

COMPETITION FOR LARGER OFFICES.

WEST BROMWICH PERMANENT BENEFIT BUILDING SOCIETY

The President of the Royal Institute of British Architects has nominated Mr. W. Alexander Harvey, F.R.I.B.A., as assessor in this competition.

TOPSHAM PUBLIC HALL COMPETITION.

Premiums of £50, £40 and £30 respectively are offered in the above competition. Assessor, Mr. Walter Cave [*F.*] Last day for questions, 1 January 1926. Designs to be sent in by 1 April 1926. Conditions may be obtained from the Clerk to the Parish Council, Topsham, by depositing £1 1s.

RECONSTRUCTION OF THE MOSQUE OF AMROU COMPETITION, CAIRO.

Members of the Royal Institute who are considering taking part in the above competition are strongly recommended to consult the Secretary R.I.B.A. before deciding to compete.

LEAGUE OF NATIONS.

COMPETITION FOR THE SELECTION OF A PLAN WITH A VIEW TO THE CONSTRUCTION OF A CONFERENCE HALL FOR THE LEAGUE OF NATIONS AT GENEVA.

The League of Nations will shortly hold a competition for the selection of a plan with a view to the construction of a Conference Hall at Geneva. The competition will be open to architects who are nationals of States Members of the League of Nations.

An International Jury consisting of well-known architects will examine the plans submitted and decide their order of merit.

A sum of 100,000 Swiss francs will be placed at the disposal of the Jury to be divided among the architects submitting the best plans.

A programme of the competition when ready will be despatched from Geneva, and Governments and competitors will receive their copies at the same time. Copies for distant countries will be despatched first.

The British Government will receive a certain number of free copies. These will be deposited at the Royal Institute of British Architects, and application should be made to the Secretary, R.I.B.A., 9 Conduit Street, W.1, by intending competitors.

Single copies can be procured direct from The Secretary-General of the League of Nations at Geneva, for the sum of 20 Swiss francs, payable in advance, but will not be forwarded until after the Government copies have been despatched.

On the nomination of the President of the Royal Institute, Sir John Burnet, A.R.A., has been appointed as the British representative on the Jury of Assessors.

AUSTRALIAN WAR MEMORIAL—CANBERRA.

Competitive designs are invited for the Australian War Memorial at Canberra.

The competition is open to architects of Australian birth, wherever located, and in order that competitors who are abroad may be placed on the same footing as those in Australia, the conditions governing the competition will not be available in Australia until 15 August, at which date they will be available at the office of the High Commissioner, Australia House, Strand.

To ensure that the same working time is allowed to all competitors, the competition will close simultaneously in Australia and London on 31 March 1926, up to noon, on which date designs from architects in Europe will be received at the office of the High Commissioner in London.

Intending competitors should communicate with the Official Secretary to the Commonwealth of Australia, Australia House, Strand, W.C.2

Members' Column

MR. H. MACINTOSH [*F.*].

Mr. Hugh Macintosh, F.R.I.B.A., of No. 1 Imperial Buildings, East Croydon, has now taken additional offices at 8 Princes Street, Westminster, S.W.1. Telephone: Victoria 2835.

PARTNERSHIP.

Architect, in old-established practice in a large provincial town, is open to consider a partnership with a young qualified Architect, who must be a first-class designer and draughtsman. Capital is not required, but applicant must be willing to work for a probationary period at a nominal salary.—Apply Box 2216, c/o Secretary R.I.B.A., 9 Conduit Street, London, W.1.

CHANGE OF ADDRESS.

The office address of Mr. George J. J. Lacey, L.R.I.B.A., is now 12 Gray's Inn Square, W.C.1. (Telephone: Chancery 8587).

Mr. O. Keith Beattie [*L.*], has changed his address from 1 Albany Court Yard to 62 St. James's Street, S.W.

E. B. Musman [*A*], has changed his address from 73 Gower Street, W.C.1, to 8 Prince's Street, Westminster, S.W.1.

OFFICE WANTED.

F.R.I.B.A. requires small unfurnished office, preferably with use of general office. W. or W.C. district. Please state full particulars with inclusive terms.—Box 9135, c/o Secretary R.I.B.A., 9 Conduit Street, W.1.

OFFICE TO LET.

Fellow offers light office S.W.1 district, £70 p.a. inclusive, lighting, heating; use of 'phone and clerical service can be arranged on mutual terms, or furnished £100 p.a.—Box 4346, c/o Secretary R.I.B.A., 9 Conduit Street, W.1.

Minutes VII

At the Seventh General Meeting (Ordinary) of the Session 1925-1926, held on Monday, 1 February 1926, at 8,30 p.m., Mr. E. Guy Dawber, F.S.A., President, in the chair.

The attendance book was signed by 22 Fellows (including 7 members of the Council), 20 Associates (including 3 members of the Council), 8 Licentiates, 2 Hon. Associates, and a large number of visitors.

The Minutes of the Meeting held on 18 January 1926, having been published in the Journal, were taken as read, confirmed, and signed as correct.

The Hon. Secretary announced the decease of:

Mr. Charles Herbert Ashworth, elected Fellow 1906.

Mr. Walter Bryan Wood, elected Associate 1881.

Mr. Francis Spence Baker, elected Associate 1892, Fellow 1901. Mr. Baker was a Past-President of the Royal Architectural Institute of Canada, and for a period of 20 years was R.I.B.A. Hon. Secretary for Canada, resigning the position at the end of last year.

And it was Resolved that the regrets of the Institute for their loss be entered on the Minutes, and that a message of sympathy and condolence be conveyed to their relatives.

The following members, attending for the first time since their election or transfer, were formally admitted by the President:—Mr. E. A. Fermaud [*F.*], Mr. John Murray [*F.*] (Luton), Mr. W. H. Raffles [*F.*], Captain B. Seymour Baily [*A.*], Mr. W. B. Edwards [*A.*].

The President, having delivered the Annual Address to Students, a vote of thanks was passed to him by acclamation, on the motion of Sir Frank Dicksee [Hon. Associate], President of the Royal Academy, seconded by Mr. Joseph Wells, M.A. [Hon. Associate], Vice-Chancellor of the University of Oxford.

The Presentation of Prizes was then made as follows, in accordance with the Award:

The Tite Prize: Certificate and £50.—The Tite Certificate to Mr. A. Calvaley Cotton.

The Owen Jones Studentship: Certificate and £100.—The Owen Jones Certificate to Mr. Ernest Dinkel.

The R.I.B.A. (Alfred Bossom) Studentship: A Gold Medal and £250.—The Gold Medal and a Silver Medal to Miss Doris Lewis [*A.*], a Silver Medal to Mr. E. H. Ashburner.

The Grissell Gold Medal and £50.—The Grissell Gold Medal and a cheque for £50 to Mr. John William Wood.

The Henry Saxon Snell Prize (not awarded).—A cheque for £15 to Mr. Arthur E. Cameron.

The Ashpitel Prize: Books to the value of £10.—To Mr. Christopher Green, B.A.Oxon.

The R.I.B.A. Silver Medal for Post-Graduate Students of Recognised Schools.—To Miss Thelma Silcock, of Liverpool University School of Architecture.

The proceedings closed at 9.30 p.m.

It is desired to point out that the opinions of writers of articles and letters which appear in the R.I.B.A. Journal must be taken as the individual opinions of their authors and not as representative expression of the Institute.

Members sending remittances by postal order for subscriptions or Institute publications are warned of the necessity of complying with Post Office Regulations with regard to this method of payment. Postal orders should be made payable to the Secretary R.I.B.A., and crossed.

R.I.B.A. JOURNAL.

Dates of Publication.—1925: 7th, 21st November; 5th, 19th December. 1926: 9th, 23rd January; 6th, 20th February; 6th, 20th March; 10th, 24th April; 8th, 22nd May; 12th, 26th June; 17th July; 14th August; 18th September; 16th October.